KETS
Master Plan
for
Education Technology

FY2001 – FY2006

MAY 2000

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Kentucky Education Technology System FY2001-FY2006 Master Plan for Education Technology

EXECUTIVE SUMMARY

PHASE 1: THE FIRST EIGHT YEARS. WHAT WE HAVE DONE SO FAR.

By the end of FY2000, KETS will have neared completion of the goals of Phase 1. This includes obtaining the required funding for the completion of Phase 1, developing technical, product and design standards then deploying those tools equitably. Achieving equity in the ratios of technology funds for schools (i.e., elementary, middle, high schools, state and locally operated Area Technology Centers, Family Resource Youth Service Centers) and ensuring each school had a similar ratio of technology tools in their tool box is a goal we have worked very hard to attain. These tools include the Internet, e-mail, phones in the classroom, the Virtual Library/High School/University, productivity software (e.g., word processing, spreadsheets, databases), a wide range of instructional software and administrative tools for students, teachers and administrators. Close to $620M will have been spent but $350M will have been saved through the federal e-rate program and leveraging our entire state for discounts on our KETS product standard contracts.

So you may ask what progress has this substantial investment gotten us so far in the Kentucky classroom and in preparing our children for the Information Age Workforce. In a recent Milken Foundation survey of different states, Kentucky was tops in the nation when asked about the difference technology had made in three categories; Students are more engaged in learning (83%), Students become more independent learners (82.8%), and Students understanding of academic subjects has deepened (74.8). Also, Kentucky's Student Technology Leadership Program in which students gain very marketable technology skills and experiences for the workforce while also helping their school's technology support needs was listed at the highest level when compared to other states, but we can still do much better. With the efforts of the Office of Teacher Certification, the Kentucky Association of Technology Coordinators and the Office of Education Technology working cooperatively with the Education Professional Standards Board we were able to get Kentucky's first technology certification standard approved for new and experienced teachers effective in FY2001. This technology skills standard will impact Kentucky universities who must prepare new teachers for the Kentucky classroom, as well as the interest and need that experienced teachers will have in professional development for basic and integrated technology skills. The State New Economic Index, published last summer, listed the KETS Technology in Schools program as Kentucky's leading economic development initiative. Also, two separate surveys on attitudes toward technology by teachers, principals, superintendents, school council parents, school board members and the general public parents were all very positive.

PHASE 2: THE TOP PRIORITIES FOR THE NEXT 6 YEARS

There are some matters in Phase 2 that we need to focus on as they were not sufficiently accomplished or addressed in Phase 1. These will be our top priorities for the next 6 years. These matters include: (1) develop the basic technology skills and certifications required for all educators, (2) address the techniques of technology professional development required to more effectively reach a much higher percentage of teachers and administrators so they can more effectively integrate technology into what they do. We want all teachers to be trained on technology basic skills and integration skills for instruction. We are at the absolute critical stage for this to occur. Purchasing all this hardware and software will make very little difference unless that is done. By far the most successful way to address PD for teachers is to have a resource that goes into the classroom versus counting on teachers to go to large group training, (3) develop the student technology skills required in all parts of the curriculum that will be part of the program of studies, core content and CATS while also increasing the success, depth and capabilities of our STLP program, (4) address the technology talent (the people) required within and outside the district to maintain, operation and support the Phase 1 deployment. It takes top talent to operate, maintain and plan for technology resources in schools. In most communities in Kentucky, the local school system has by far the most advanced and sophisticated technology deployment. Gartner Group estimates that 6.5% of the total workforce you have available should be information technology related positions. These are also typically well paying positions. The STLP program can help reduce the requirement of 6.5% and costs but a large amount of adult operations and maintenance talent is still required to lead these services for their schools, as well as mentor the students of the district's STLP program, (5) ensure education data available through Munis, the School Student Management System (SSMS) and enterprise data base becomes a quality strategic asset for all levels of leadership, (6) better integrate technology into comprehensive school planning and instruction, (7) assist districts with resources/services and finding/developing resources (e.g., e-rate, TLCF, KETS Funds, STLP) to support their technology needs, (8) highlight the need of increasing the availability of the school technology resources (e.g., virtual high school, virtual university, KTLN) after school hours for students, teachers, administrators, parents and community members so they can improve and retool their skills, a low percentage of Kentucky homes have computers when compared to other states and only 12.5% of Kentucky's population has a bachelor's degree (or higher). Therefore the best opportunity for most Kentuckians to access technology will be in their local schools, which are normally within only 5 miles of their home, (9) prepare our students for the information age and in parallel work with economic development representatives to ensure our economy is prepared to take advantage of our graduates so we won't lose them to other states. The fastest growing occupations in Kentucky by 2005 are projected to be computer, mathematical, engineering and related occupations, and (10) address the financial resources required and available each year to operate, maintain, incrementally

replenish and expand the technology system that was installed across the state during the first 8 years.

The Funding Required

The most recent information available from the Gartner Group shows that Educational and Governmental organizations typically budget 6% of their entire budget for information technology. This 6% includes operations, maintenance, incremental replacement and expansion. Our analysis for Kentucky's need comes to 4% of the total educational budget ($2.9B per year) or 3.73% of all the revenues available to schools (est. $3.2B per year). If it took $620M to initially install this complete voice, video and data system for schools, it will take some annual percentage (e.g., 20%) of that initial $620M investment to maintain, operate and incrementally replace what is already there. The total education budget allocates $5,085 per student. The technology portion would be $214 (4% of $5,085) per student per year to provide each student with all the technology hardware, software, networks, services and support required. Since 60-70% of the new jobs created in Kentucky and United States in the next 10 years will require technology skills, that 4% investment has a lot of beneficial short and long-term impact for students.

The projected need per year in KETS funds is $35M. In the 1992 Master Plan we estimated the reoccurring KETS funds required would be $30M per year. In the 1998 Master Plan we estimated it would take $34M in KETS funds per year. For 8 years we have known Phase 2 would require at least $30-35M per year to operate and maintain what we already purchased in Phase 1, along with incremental replacement (e.g., student workstations) of hardware and software. This $35M (1.2% of the total Education Budget) would give an offer of assistance of close to $40 per student per year, with the district being required to match that offer with local funds (*other local funds will be required as well).* In 1998 the KETS budget was reduced by 25% from a baseline of $20M per year to $15M per year. However the effects of this reduction were not felt due to the surplus funding we received in each of the past two years that more than made up the difference. The budget is $15M for FY2001 and $20M for FY2002, however the baseline will remain at $15M per year going into the FY2003-FY2004 biennium unless it is raised. It will be imperative to raise the baseline towards $35M per year beginning in FY2003 since there is no surplus funding identified to supplement it and the e-rate program discounts for the state, district and schools networking requirements (e.g., Internet data line charges) will end during that biennium. $15M allows for an average offer of $9 per student in FY2001; and $20M allows for an average offer of $18 per student in FY 2002. In the 1998-2000 biennium, the Governor and the legislature invested a one time surplus funding (avg $112 in FY99 and $61 in FY2000) enabling Kentucky to the first state of this size to reach the infrastructure goals of Phase 1. However technology requires a certain minimal level of funding to sustain excellence after the initial deployment.

We strongly encourage district leadership not to use this expected reduction in KETS offers of assistance over the next few years as a reason or opportunity to move dollars away from your district's allocated technology budget. The KETS offers of assistance and matching fund concept is valuable for those leading the technology effort within a district because a certain portion of the district's entire budget is set aside by that amount for only technology purchases and could not be spent on other things (e.g., pavement). It is very unfortunate that we will be unable to participate to the levels of KETS offers of assistance matching funding that we have had for you over the past 8 years; however, please make an effort to find other methods within your district's overall budget to sustain 3.73- 4.22% in technology funds for operations and maintenance for your existing technology investment and its incremental replacement. However, the state shared services (e.g., telco/Internet/e-mail data line fees from the district to the state, Munis software, Munis and KETS Help Desk, Virtual Library fees) for your district office and schools will continue to be provided, so you do not need to plan to find additional district funds pay for these costs as well.

DIFFERENCES BETWEEN THIS MASTER PLAN AND THE PREVIOUS ONE

CHANGES IN FUNDING SOURCE OR ELIGIBILITY:

Every line item in this Master Plan is a reoccurring expenditure. In the previous Master Plan the only line item that was reoccurring and eligible for EDTECH funds was professional development. This means there is an unmet each year for every line item. Specifically you will notice that maintenance (e.g., hardware repair, software updates), operations (e.g., school to district data lines, STLP stipends), multi-media expenditures (e.g., portable computer projection devices for the classroom, KTLN), and a few other things for Phase 2 line items above, are now EDTECH eligible. The hardware maintenance includes the costs for the technicians as well as parts. The 10% discretionary program for Phase 1 is no longer needed for Phase 2 since all these items above now have line items that allow EDTECH funding. The voice communication between teachers and parents is now listed as a line item even though it is still a local expenditure mainly to ensure folks are aware that this is a cost that always needs to be considered. You will have the ability to make strategy decisions about which KETS product standard printers you buy. For example, if you want to buy a KETS color laser printer instead of 5 inkjets printers, you can. The number of instructional fileservers has been increased from 1 for every school and 2 for schools above an ADA of 600, to 2 for every school and 3 for those above an ADA of 600. The costs to pay for the voice, video and data wiring parts, labor and install (not the active network components) is now a Facilities cost and is shown with an "F" as the funding source. Administrative fileservers, printers and workstations at the district office are now eligible for EDTECH funding. The cost for the school student management software help desk support is now listed as a cost that the state will 100% pay for on behalf of the schools as part of a large volume discount.

THE PEOPLE NEEDED

This Master Plan recognizes the personnel resources and costs required for the operations and maintenance of Phase 1 and 2. The need for skilled technology staff is roughly 49% of the overall technology costs to provide state, district and school technology services for students, teachers and staff. Leadership is usually the key to success and technology is no different. Part time technology leadership wearing several other hats in the district with no other internal staff available to assist them with their technology services to schools is usually struggles when trying to attain the goals of KETS for students, teachers and administrators. This is especially true now when considering the amount of technology deployed in each Kentucky school during the past few years. Within the district, this Master Plan recognizes the need for Instructional Technology Integration Leadership, Administrative Technology Integration Leadership, and Technical Services Leadership that ensures synergy between each of these 3 elements for the district. Typically in government or private industry the technology services leadership will come from one person that ensures all technology areas and applications are working together as a team versus isolated, uninformed and in duplication with other technology efforts. However the district has the option to organize however they desire while meeting this functional requirement. Unlike the previous Master Plan we have made technology leadership an EDTECH fundable line item and will allow the district to spend up to $50,000 each year on the leadership it takes to ensure technology is being integrated into instruction, technology is being integrated into the administrative tasks of the district and the technology services (e.g., e-mail, Internet, network mgt) are of the highest quality and readiness for students, teachers and administrators. This leadership will also ensure the efforts are coordinated between these 3 major areas and are well informed of each other's efforts.

Besides the state shared services available to schools, the district's technology leadership will need internal or outsourced staff to help them provide district shared technology services to their schools. In the past 2 years there has been 5-6 times more technology deployed compared to previous years, so the number of people that could provide operations, support and maintenance in the past is not the same number required for the future (beginning now). To keep existing hardware at a high state of readiness and to be a dependable resource for teachers and students, we recognize the need to fund for multiple in-house or outsourced technicians. This will be an average of 2-3 positions per district. These positions can support the district-shared services for schools. This plan also includes the funding for a STLP mentor to lead the STLP students. That may be a single position or multiple people within a school or district. A salary or a stipend as compensation for leading their school's STLP program, which we consider crucial to KETS success, can fund this. The average district will have 14 full time equivalent STLP positions (which may be 50 students). STLP students can save each district $210,000 per year.

The line item for Proficiency Training provides for either one person or multiple people providing one-on-one PD directly for teachers in their classroom or at the administrator's

location. It also allows for on-line training and large group for those wanting a more time extensive and broader understanding of the material. The PD line item has been more than doubled to what it was before. However, we do recognize there are other PD types of funds available beyond EDTECH funds for a district to supplement their PD needs.

Other Major topics covered in THIS Master Plan

We describe the requirements of Phase 2 in detail, including the concept of district and state shared services for schools, so an enterprise approach is taken when it is most appropriate but still leaves a lot of flexibility for teachers on instructional software selection and usage of the technology tools in their instruction. We discuss the importance of a Kentucky enterprise database that serves parents, community members, schools, district office staff, board members, KDE, and legislators. This includes the school student management, Munis data and other data sources. We hope that by making information easier to access, these groups will improve decision making and awareness in the areas of teacher quality, discipline, health services, attendance, transportation, testing, general ledger, etc. It allows similar kinds of comparison of data from different sources that you saw with the school report card but in a much more powerful way.

Equity, Standards-based Planning, and Accountability

Finally, the fundamental concepts of equity, standards-based planning, and accountability which are so vital to the vision of the 1992 Master Plan for Education Technology remain. They are as important today as they were eight years ago. They are proven and must be retained as guiding principles and benchmarks for all future decisions. We have incorporated, therefore, the concepts of the original Master Plan into this new Master Plan that will guide progress from 2000 and beyond.

Kentucky Education Technology System FY2001-FY2006 Master Plan for Education Technology THE DETAILS

Anticipated Overall Benefits of KETS for the next 6 years

Major beneficial impacts of the Kentucky Education Technology System are anticipated in several areas:

Benefit	
Greater and more meaningful interaction between Family, School, and Community	• Expand parental access to school, administration, and teachers via technology • Remove time, place and distance barriers to teacher, student, and parent communication outside the normal school day
Improved Student Learning	• Increase thinking and problem solving skills by analyzing information with technology tools • Develop communication skills through writing and the exchange of information with students at other sites • Availability of access to instructional computer software across the network • Development of basic skills and concepts from simulations and computer-assisted instruction • Availability of instructional databases to help students expand their research/information processing skills • Development of student awareness of a multi-cultural world view through telecommunications access and communication with students at other schools throughout the world • Encouragement of respect of rights of others and ethical issues in using school technology assets

Increased Teacher Productivity	• Improved effectiveness and efficiency of instruction, curriculum development, school organization and operation • Telecommunications access for improved communication among teachers, parents, and students • Computer-managed instruction delivery system • Use of computer for special education management • Reduction of teacher paperwork • Encouragement and support for joint curriculum development and sharing • Improved capacity to individualize instruction and to monitor assessment
Enhanced Communications	• Immediate transmittal of memos, letters, bulletins, reports, and documents • Improved communication between all buildings, school districts, libraries, and KDE • Facilitation of communication between two individuals, among several individuals (conferencing), from one individual to a select list or network-wide • Automation of calendars and scheduling to assist coordination of personnel, building, and district resources • Creation of "electronic communities"

Data Collection and Processing	• Improved accuracy and timeliness of information • Centralized data reduces costs and errors • Data collection becomes a by-product of daily processing activities • Required reports are automatically generated from the database • Data retrieval is simple and available in multiple formats providing flexible access • Data is maintained (stored) electronically and printed only when required • Required Commonwealth data can be reported electronically
A Robust Network Infrastructure	• Interconnection of all school buildings, educational centers, libraries, and Commonwealth-wide education networks • Establishment of common resource databases • Adoption of standards and protocols for data collection and for communications • Current and timely information for decision making • Quick and easy sharing of information • Equitable access to information regardless of the size of location of the school districts • Information processing and communication services at reduced costs

Policy As a Lever for Change

It should be apparent that implementation of the Master Plan is based upon carefully formulated state-level policy which views the public schools systemically. During the first eight years of the program policy has been used effectively as a lever and catalyst for change.

The Milken Foundation, in writing about state policy, notes that:

> " . . .Success is determined to a great extent by the political, financial, and economic contexts . . .. Sound policy goes beyond merely understanding strategies that have worked elsewhere; it involves recognizing which strategies are most likely to be fruitful in your own state."

The Milken Foundation highlights ten state level policy levers that are typically successful in bringing about desired change. Implementation of the Kentucky Education Technology System has and will continue to be carried out within this general framework:

- Set goals related to students and communicate the vision
- Seed prototypes, demonstrations and research
- Diversify revenue streams
- Focus investments
- Leverage economies of scale
- Support leadership and require planning
- Set certification standards for educators
- Set technical standards
- Establish a support structure
- Require accountability

Districts and schools are adapting this same policy framework as they deal with the same issues locally that present themselves at the enterprise level. We have followed 8 of these 10 recommendations. In fact Kentucky is given as the example in many of them. However we will continue to need to address and improve on all 8 of these areas each year. However the other two (certification standards for all educators and accountability) have not been fully addressed yet but will during the next 6 years.

Teacher Technology Competency Skills and Professional Development

The onset of Consolidated Planning made it possible for to incorporate appropriate technology training as a requirement for every single teacher and administrator for the first time. To that end, Department recommended that the need for technology professional development be budgeted on a per teacher/administrator basis. This strategy formed the basis for a set of initial professional development standards against which school and district progress could be monitored on a more meaningful basis.

These emerging standards were based on three fundamental beliefs:

- All teachers must learn to use technology at higher levels;
- Professional development which builds technology skills should not be limited to the subject of technology; and
- Professional development is an ongoing continuous effort, incorporating the four levels described previously.

As to how teachers use technology in the classroom, the Milken Study indicates that most teachers in Kentucky are still using technology primarily for communicating and productivity. While the responses in this area are generally higher than those in other states, Kentucky does fall below the national average in using technology when teaching science. It is clear that much more work needs to be done in Kentucky, as well as in all states, before teachers are frequently using technology to support the curriculum.

Questions about the technology skill levels of the typical teacher show Kentucky's teachers falling behind their counterparts in other states. While this is self-reported data and not based on actual metrics or skills tests, it is very disturbing to believe that Kentucky's teachers do not generally perceive themselves to be skilled in technology use.

Just so, on the topic of teacher technology training, the Milken Study confirmed that Kentucky teachers may not be spending sufficient amounts of time developing their technology skills in structured learning situations - - either on their own or in groups. Indeed, Kentucky teachers apparently spend quite a bit less time in technology training than their counterparts in other states. However the good news is we found out during the development of the teacher standards that 72% of the teachers surveyed were in favor of teacher standards. This tells us that teachers' attitudes beliefs about technology are favorable. This means if we can find ways to better deliver professional development to them (e.g., PD Direct, on-line) they will be receptive towards it. Also the education administrators in Kentucky strongly favored the creation of a teacher technology competency standard.

Teacher Technology Competency and the Role of the Teacher in a Technology-Rich School

The technology professional development needs of Kentucky's teachers are wide-ranging and not easy to articulate. Indeed, there is very little data about how new teachers and experienced teachers are being prepared to use technology and even less about how that training transfers to practice in the classroom or how technology-enabled teaching impacts learning. However, if the data from the Milken Study is correct:

Kentucky teachers believe that technology has significant positive impacts on learning

- Most Kentucky teachers do not classify themselves as having advanced technology skills
- Kentucky teachers spend less time in technology professional development than do those in most other states

The issue of teacher technology competency is of course a subset of the issues currently being debated in Kentucky about teacher quality generally. If some of the recommendations currently being offered are enacted, the strategies adopted for increasing technology competency will necessarily be an integral part of a broader approach to improving the quality of the current and future teaching workforce.

However, there are steps already underway which will begin to address this issue.

In May 1999, the Kentucky Education Professional Standards Board adopted the first comprehensive technology standard for both new and experienced teachers. The adoption of this standard is already impacting the teacher preparation programs at the states colleges of education. In addition, many districts are incorporating the standard into their certified personnel evaluation and professional development plans. The adoption, however, is just a beginning. The incorporation of the standard into the evaluation and professional development plans of all teachers should not be a matter of local discretion. Further, the technology literacy level of administrators will need to be increased so that they can appropriately influence and evaluate the use of technology by teachers in daily practice. We will need to work very closely with

universities during the next few years so they can better prepare students graduating from their campuses to be ready for the Kentucky classroom. We will also be working with them to help us with experienced teachers. Specifically Morehead State University appears to have the highest percentage of their College of Education staff that is skilled in this area. We will start with them.

Technology Competencies for Education Administrators

The Kentucky Department of Education is working with several other national groups to

> " . . .Develop, by national consensus, a set of standards for pertaining to the role of K-12 school administrators regarding the use of information and communication technology in schools."

Those participating in this national effort include: American Association of School Administrators, National Association of Elementary School Principals, National Association of Secondary School Principals, National School Boards Association, International Society for Technology in Education, North Central Regional Technology in Education Consortium, North Central Regional Educational Laboratory, Southern Regional Education Board, Consortium for School Networking, Kentucky Department of Education, Mississippi Department of Education, Center for School Leadership Development – University of North Carolina, College of Education – Western Michigan University.

Kentucky and her partners believe that the roles and responsibilities of education administrators are very significant with regard to the effective use of technology in schools to yield optimal instructional benefits. They may be, in fact, the most important agents of change for accelerating the technology competencies of the teachers whom they lead and supervise. Conversely, education administrators who are neutral or less than supportive regarding technology can severely limit a teacher's ability to infuse technology into the curriculum.

The Technology Standards for School Administrators Project will produce the required information and provide the necessary guidance. The standards created by the proposed project will be of value in many arenas, including self-directed professional improvement by practicing administrators, curriculum development for educational administration graduate programs in universities, school system professional development for administrators, and other programs that serve professional development needs of school administrators.

The establishment of standards alone is not enough to ensure that improvements will occur. Real impact in schools depends on standards being part of a system involving reflective practice, capacity building, accountability, and continuing revision of the standards. Therefore, the proposed standards will be accompanied by guidelines for their effective adoption and implementation and a strategy for coordination among participating organizations to embody the standards in pre-service and in-service professional development of administrators.

Professional Development Direct (PD Direct, on-line, self-paced, and large group)

The Kentucky Department of Education's Professional Development Matrix Team recommends adherence to several principles of effective professional development based on the findings of recent research. These principles focus attention on professional development strategies for improving students' learning over time.

- Professional development should be based on analyses of the differences between (a) actual student performance and (b) goals and standards for student learning.
- Professional development should be primarily school-based and built into the day-to-day work of teaching.
- Professional development should be continuous and on-going, involving follow-up and support for further learning, including support from sources external to the school that can provide necessary resources and new perspectives.
- Professional development should involve teachers in the identification of what they need to learn and in the development of the learning experiences in which they will be involved.
- Professional development should be organized around collaborative problem solving.
- Professional development should incorporate evaluation of multiple sources of information on (a) outcomes for students and (b) the instruction and other processes that are involved in implementing the lessons learned.
- Professional development should provide opportunities to gain an understanding of the theory underlying the knowledge and skills being learned.
- Professional development should be connected to a comprehensive change process focused on improving student learning.

Engaging teachers in meaningful technology professional development continues to be a challenge. Several years ago, the state abandoned the large group training approach in favor of strategies that involved smaller groups working on content-based activities lead by instructional technology leaders. Still, even though the amount of state technology funding made available to districts doubled in 1998, most districts invest only about $50 per teacher per year in technology professional development.

In part, districts struggle because there is not an extensive network of professional development providers in the state with the skills and experience necessary to prepare teachers for effective technology use. In fact, the Kentucky Long-Term Policy Research Center's summary of the status of Kentucky teacher professional development generally is quite applicable to the dilemma technology professional development:

"If Kentucky policymakers want improvements in teacher knowledge and skills sooner as opposed to later, they will need to focus efforts on educators already in the classroom and the professional development system, which is presently ill equipped to take on the task. Kentucky's professional development system could be moved in a more productive direction, but to do so would require a concerted state policy effort as well as a variety of incentives to attract—or create—high-quality providers to deliver a professional development program solidly grounded in academic content. Provisions would also be needed to ensure effectiveness and targeted program delivery with follow-up and ongoing involvement. Some professional development shortcomings could be addressed through technological means. Additional policy changes may be needed to encourage academic experts to be more responsive to the needs of the state's middle and secondary school teachers."

Anecdotal information tells us that schools who are hiring dedicated technology resource teachers may have found the most effective model for raising levels of teacher technology competency, as well as teacher's self-confidence in their ability to plan for and manage technology in the classroom. This model is becoming known as "PD Direct." These Technology Resource Teachers engaged in PD Direct are not teachers of students. They are, rather, certified staff with high levels of technology skill that work with classroom teachers on an as-needed basis in the classroom to provide just-in-time training as well as consultation with curriculum integration and instructional design consulting.

Typically, Technology Resource Teachers:

- Work in the teacher's classroom
- For short periods of time
- On specific tasks
- To show the teacher how to use technology to teach specific content from the curriculum

Still, the role of the teacher in a technology-rich classroom will be debated for quite a while. Technology has the capability to enable student-centered, self-directed learning to the extent that the way students interact with technology with online learning (which used to be thought of as only "distance learning") and learning in the traditional classrooms is merging. Consider this comment about the student as customer of the education system by John Sculley, former CEO of Apple Computer:

> "Schools should think of their students as customers who will be in as much control of how they learn as e-commerce customers are in control of what they buy. The issue shouldn't be just when will classrooms get wired to the Internet, but will these student customers do most of the learning over the Internet from the institution of the traditional school or will they access interactive learning sessions from home, from a library, or on a field trip. It is inevitable that the role of teachers will change as Internet-based curriculum becomes more important. But there is an opportunity for teachers to have an even more important role in the lives of their students if they are willing to accept the inevitability of the Internet as the underpinning of the new economy and appreciate that students as customers will have great power to determine how they will learn."

As teachers understand more about how to help students leverage the power of technology to learn on an anytime, anywhere basis, it will be important that the Department of Education lead by example. That is, the Department needs to adopt the technical assistance model it employs to guide teachers and the types of materials and resources it develops for their use to this new environment. Teachers need access to online learning and online resources for the same reasons that students do. Teachers have equal capacity to guide their own growth and development if provided with time, motivation to learn, and the opportunity to achieve.

Student Technology Competencies

The concept of developing Kentucky student technology competencies will be based upon the National Educational Technology Standards (NETS) *Technology Foundation Standards for Students* in pre-kindergarten through 12th grade. This work continues and has accelerated with the adoption of technology competency standards for teachers. The steps after this will be to get these standards integrated into the program of studies, the core content and eventually CATS.

We recognize it will take significant time and energy to achieve each of those steps during the next 4-6 years.

According to the International Society for Technology in Education (ISTE) who promulgates standards, a combination of essential conditions is required to create learning environments conducive to powerful uses of technology, including:

- Vision with support and proactive leadership from the education system
- Educators skilled in the use of the technology for learning
- Content standards and curriculum resources
- Student-centered approaches to learning
- Assessment of the effectiveness of technology for learning
- Access to contemporary technologies, software, and telecommunications networks
- Technical assistance for maintaining and using technology resources
- Community partners who provide expertise, support, and real-life interactions
- Ongoing financial support for sustained technology use
- Policies and standards supporting new learning environments

These essential conditions form a framework of objectives for creating learning environments in Kentucky classrooms. The student technology competency standards will form a foundation for more engaged self-directed learning and higher levels of student achievement. They fall into six broad categories:

Basic operations and concepts

- Students demonstrate a sound understanding of the nature and operation of technology systems.
- Students are proficient in the use of technology.

- **Social, ethical, and human issues**
  - Students understand the ethical, cultural, and societal issues related to technology.
  - Students practice responsible use of technology systems, information, and software.
  - Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity.
- **Technology productivity tools**
  - Students use technology tools to enhance learning, increase productivity, and promote creativity.

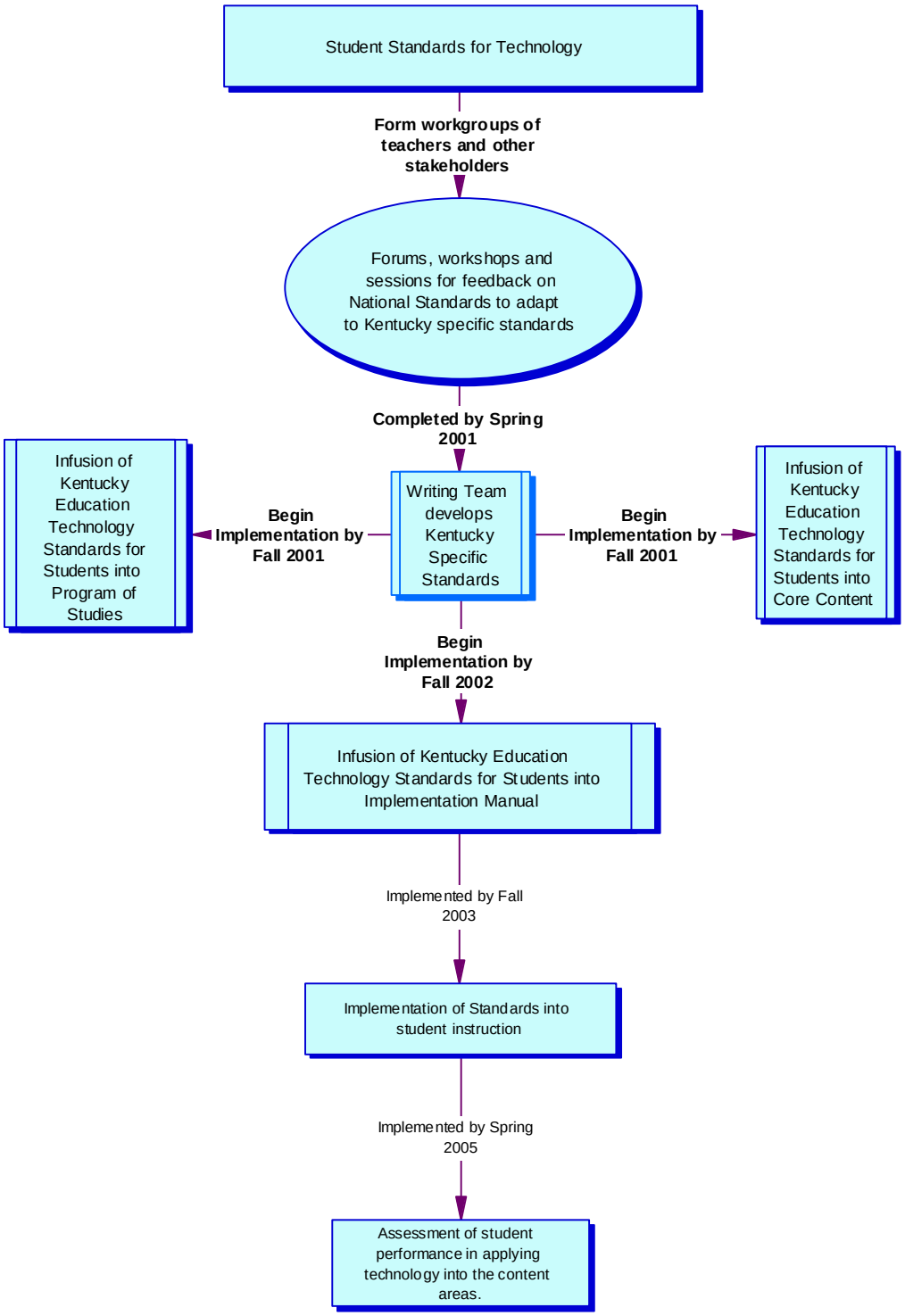
    - Students use productivity tools to collaborate in constructing technology-enhanced models, preparing publications, and producing other creative works.

- **Technology communications tools**
    - Students use telecommunications to collaborate, publish, and interact with peers, experts, and other audiences.
    - Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.

- **Technology research tools**
    - Students use technology to locate, evaluate, and collect information from a variety of sources.
    - Students use technology tools to process data and report results.
    - Students evaluate and select new information resources and technological innovations based on the appropriateness to specific tasks.

- **Technology problem-solving and decision-making tools**
    - Students use technology resources for solving problems and making informed decisions.
    - Students employ technology in the development of strategies for solving problems in the real world.

The work plan for implementing student technology competencies into the curriculum and assessment is as follows:



The Power of Students: Student Technology Leadership

Technology is popular among a broad population of students and has the fairly unique ability to attract students who may otherwise be at-risk. Working as Student Technology Leaders, Kentucky students at all levels of the public education system are beginning to take on important roles as technology trainers, network engineers, instructional design consultants, web masters, and teaching assistants. The incentives are obvious:

- Students who are involved in extra school activities in addition to regular classes have a significantly greater chance of success. STLP is a key component of the overall instructional program.

- Students need a variety of opportunities to learn because of their different learning styles and multiple intelligences. STLP is for all students, regardless of their learning style.

- The most powerful learning happens in authentic situations. STLP engages students in authentic learning and real work.

- Learning which involves service to others helps lay the foundation for good citizenship and leadership. Students are prepared to provide training in the use of technology as a learning tool as well as a productivity tool for the home and at work.

Kentucky's schools had discovered that students could provide extensive on-site technical support that most schools and districts could not afford to buy. Students in many schools across the state were actually planning, implementing and supporting the technology in their schools. Students and STLP groups who were not following the more technical track were focusing on providing technical training to teachers, administrators, staff, parents, and the community. These organizations were typically very active in their communities: leading basic computer skills courses for groups who may not otherwise be engaged with the school; constructing and supporting web sites for their schools and communities; and serving as technology mentors for student groups in lower grade levels.

Every year, Kentucky schools were learning more about the role of students as a hugely valuable asset for the technology program. Kentucky learned too that, with these special skills, STLP "graduates" were far more successful in competing for employment, special work-study programs in post secondary institutions, and other goals, which they pursued after graduation.

We will continue to make the STLP program a top area of emphasis during the next 6 years. In order to reach schools that have not started a STLP program yet or need funds to sustain their existing STLP funds we are allocating EDTECH to be used to hire mentors for these students. The mentors are to lead, train and inspect the efforts of the STLP students in the district or school.

Staffing to Support Technology Integration

While the extent of technology deployment in schools has risen rapidly, most districts have neither organized nor budgeted for sufficient staffing to support these new assets or their effective use. In fact, districts have been largely prohibited from spending state technology funds on staffing and most district technology coordinators are not dedicated to the education technology program: most still wear many hats.

A typical district has a part-time District Technology Coordinator, one part-time technician and no instructional technology resource teacher or technology professional development staff. This is a rather risky situation. The funding made available to districts for technology in the past eighteen months has effectively equaled the entire funding over the first six years of the program. So, not only has the quantity, complexity, and sophistication of the technology that same staff supports increased tenfold but the value of the total assets for which they are responsible has increased exponentially as well.

Consider the escalation of technology deployment in light of the fact that most districts haven no more staff than they had in 1995:

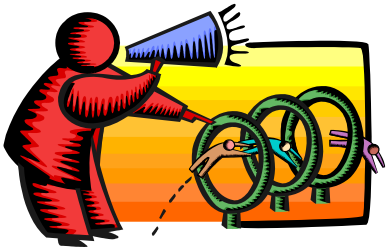
The Department is recommending that a new approach to district technology support be widely adopted:

- Each district should have full-time technology leadership whose focus is to ensure technology is making a significant instructional and administrative impact for students, teachers and administrators. The leadership should be multi-dimensional, providing direction and coordination for the instructional, administrative, and technical aspects of the district's education technology program. EDTECH funds can now be used for this purpose. The leadership should be concerned with management, planning, oversight and evaluation of these 3 major areas. The district's technology leadership should also consult with the Superintendent and local board to ensure that the district's technology implementation is consistent with the Consolidated Plan and Kentucky Education Technology System standards. This also includes coordinating staff development on technology competencies throughout the entire instructional program.
- Each district should evaluate using Instructional Technology Resource Teachers to assist with basic technology skills and the integration of the technology into instruction. EDTECH funds can now be used for this purpose. Resource teachers should be primarily concerned with providing direct training and consultations to teachers in their classroom, with special emphasis on preparing teachers to meet the teacher and student technology standards.
- Each school should have a Student Technology Leadership Program. The SLTP students will need adults either from the school or district level who function as a coordinating team to lead and mentor the development of Student Technology Leadership Programs in the school. EDTECH funds can now be used for this purpose.
- Each district should have a Repair & Maintenance technician(s), or should outsource the equivalent of this function under contract. EDTECH funds can now be used for this purpose.

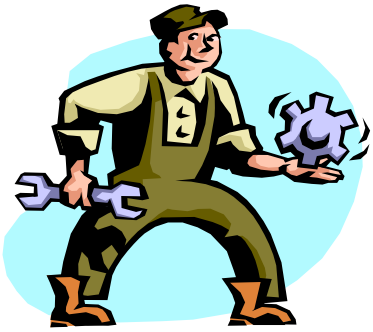
District Technology Staff

Instructional Technology Integration, Administrative Technology Integration and Technology Services

STLP Leader(s)



Two/Three Hardware Technicians (Break/Fix)



Technology Trainer(s)

Fourteen STLP Students (Full Time Equivalent)

Kentucky districts are currently responsible for managing technology assets valued at more than $600 million. Logic would dictate that qualified, full-time staff is needed.

Education Data as a Strategic Asset

The fact that the 1992 Master Plan called for a decision support system to assist the management and evaluation of the public education system in Kentucky is reviewed earlier in this document. As a fundamental component of the Statewide Reporting and Information Management System, an enterprise data model depicting the data collected and shared within the public education system has been constructed.

Still, the Department's capacity to deliver policy-worthy information to decision-makers is far from sufficient. Policy issues surrounding the public debate about teacher quality in recent months have prompted calls from all quarters of the education sector for a comprehensive system of information management in public education. For instance, the Long-Term Policy Research Center in "Kentucky's Teachers: Charting a Course for KERA's Second Decade," said:

> "A primary policy option is the creation of a comprehensive data system to track teachers in the workforce. Such a system would not be punitive in purpose, but, rather, constructed to ensure that teachers are being properly deployed given their training and backgrounds, to determine what types of professional development and educational support teachers need, to gauge supply and demand imbalances, and to ascertain what combination of teacher knowledge and skills has the greatest impact on student achievement. Until we learn more about these things through a well-designed data gathering program operated over several years, officials will be obliged to tinker with the system based on personal beliefs, experiences, and intuitions, as well as possibly contradictory input from constituents and special interest groups, rather than empirical data."

With the concurrence of the Kentucky Board of Education, through the adoption of this Master Plan Update, the Department will commit substantial new resources and high priority to development of a robust enterprise data management system that manages information across programmatic boundaries. In this context, the enterprise includes schools, districts, the state department and education partners who collect and validate data within the K12 education data model (for instance, colleges of education).

The principles under which this plan will go forward are:

- Data will be recognized as a strategic enterprise asset and managed as such.
- Enterprise-wide processes will be developed to move data collection and validation to the source and reduce duplication and redundancy.
- Data will be moved electronically and will be available electronically.
- Ownership of the various data will be explicitly identified. Associated with ownership will be procedures and processes which articulate the only circumstances under which data will be collected, validated, or purged.
- Common data definitions will be established as standards.
- Data will be differentiated from "records" in the context of public records management. The Department will review and update its procedures for managing public records in electronic format.

- Data reporting to support compliance and assurance with state and federal program requirements will be consolidated.
- Security and authentication policies will be associated with each aspect of the enterprise data model.
- Privacy will be protected.
- Policy-worthy information will be available for decision support.
- The decision support needs of the Kentucky Board of Education and others will be analyzed. Priority will be placed on supporting the information requirements of the Board within the context of current Board priorities.
- Standards will be defined for data collection and end-user reporting tools.
- Data from disparate systems will be combined in a common repository or data warehouse.
- Those who provide data to the enterprise data management system will be able to use the data management system for their own decision support needs.

This means that creation of new data collection and reporting systems in the Department that are not part of the enterprise data management model will cease. Also, existing applications will be examined for their value to the decision support needs of the data model and will be retained, migrated or terminated as appropriate.

One of the first steps in that process will be a re-design of the way student and school management data is collected and reported from the schools. The KETS product standard for student and school management software will be revised to include only a single system product standard.

While the concept of the data repository is central to the enterprise data management system, it should be clear that the intention is not to collect all data into a single repository. Only that data which is essential will be held in the repository. Estimates are that about seventy percent of data will be stored only at the school, about twenty percent will reside at the district level, and only about ten percent will be housed in the state-level repository.

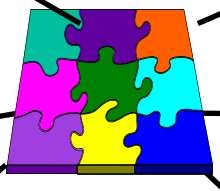
Enterprise Data Base

Dept of Ed (Fed) Data
- Grants
- Reports
- Statistics
- Etc.

KETS Network (Secure)

Web Based Access (Secure)

State and Federal Access



KETS Network (Secure)

Dept of Ed (State) Data
- Legislator requests for information
- Public requests for information
- Financial Data
- Reports
- Teacher Quality
- Teacher Credentials
- Reports
- Quality Assurance
- Analysis
- Statistics

Web Based Access (Secure)

Local Districts Access

Local District Data

Enterprise Data Base Provides:

- Virtual Database Transparent to Users
- Eliminates Redundancy
- Improves Reliability of Data
- Combines Numerous Systems
- Allows Analysis of Statewide Data
- Improvement of accuracy in time lines
- Share data across organizational lines for decision-making.
- Data collection becomes a bi-product of daily procedural activities.

Public Access

- Financial Data
- Teacher Data
- Demographics
- Attendance
- Reports
- Purchase order
- Payroll
- General Ledger

- IEP
- Fixed Assets
- Personnel
- Food Services
- Testing
- Disciplines
- Transportation
- Health Services

- Exceptional Children
- Writing Portfolio Management
- Assessment Administration
- Scheduling
- Guidance & Counseling
- Curriculum Management
- Facilities Management
- School Report Card

District Administrative Systems

The general assembly, in constructing the statutes that would result in the 1992 Master Plan For Education Technology, had called for implementation of "uniform and integrated system of standards and guidelines for financial accounting and reporting which shall be used by all districts" (KRS 156.670(3)). The statute also required "comprehensive, current, accurate, and accessible information relating to Management, Finance, Operations, Instruction, And Pupil Programs" (KRS 156.670(4)). The Master Plan specified that implementation of district administrative systems would be funded entirely by the state so that the burden of financing and project management did not fall to the local districts.

The Master Plan defined district and school administrative system implementation as including:

- A full-function Local Area Network
- Workstations, printers and file servers
- Connection of the District Office to the statewide network
- An integrated suite of office products
- Communications services, such as electronic mail, Internet, and remote access
- Financial Management System
- Transportation Management System
- Facilities Management System
- Fixed Assets
- Inventory/Warehouse
- School Food Services Management System
- Energy Management
- Legislative Bill Tracking/Monitoring
- Student School Management Data Accumulator

While we have deployed a good portion of this system during the first 8 years. There is a significant amount of the functionality in those modules that districts are not aware of or have not yet fully maximized. We will be focused on addressing that during the next Phase of KETS. The other modules will be deployed in Phase 2. We also will be upgrading the existing software system to a more graphical user interface that will make it easier for district office staff to use. This upgrade will also allow certain portions of the functionality (e.g. Purchase Orders) and data to be assessable down to the school level.

School Administrative Systems

The 1992 Master Plan and School Student Management System bid identified the need for the administrative applications that are required

- Pupil Attendance and Accounting;
- Student Demographics
- Counseling, Discipline and Guidance
- Assessment/Testing/School Performance
- Scheduling/Registration
- Grade reporting;
- Academic history
- Safety
- Classroom module
- Special Education
- Teacher Certification
- Teacher Professional Development
- Instructional management and curriculum development
- School Identification

Mainly the attendance and student demographics modules are in place in each school now. Over the next 6 years our goal is to standardize on one SSMS product standard and deploy the remaining modules that integrate with that standardized SSMS. Funding for implementation of school administrative systems is to be shared equally by the state and the districts or other funding sources the district may have available to them. These applications are implemented in addition to the same suite of office and communications services present at the district office.

Statewide Reporting

The Master Plan called for a decision support system to assist the management and evaluation of the public education system in Kentucky. The primary users of the system were identified as the state department, the Governor's office, and the state legislature. The Statewide Reporting and Information Management system became operational in 1996. As a fundamental component of the system, an enterprise data model depicting the data collected and shared within the public education system has been constructed which is still being refined and expanded for the next 6 years for the enterprise database.

However, the fact that multiple data collection systems had been implemented in schools severely hampered the effectiveness and value of statewide reporting efforts. The decision not to

standardize systems at the school for student and school management opened the door for the proliferation of additional school administrative system modules from which data could not easily be collected, aggregated, analyzed, defined in a consistent way and integrated with the other KETS product standard products.

Integrating Technology into Comprehensive School Planning and Instruction

Since the 1990 Kentucky Education Reform Act, the Department had supported local educators as they worked together for the good of students trying to leverage ideas, people and funds across multiple federal and state programs - - all with their own disparate planning formats and reporting requiring. By late 1997, the Department adopted a consolidated format that fostered collaboration and integration between twenty-one state and federal categorical programs, one of which was education technology. A key objective for us over the next 6 years is to ensure technology is being addressed as a tool for them in their consolidated plans objectives. This is an indicator of technology progress that we always need to inspect when we visit a school or district.

In order to assist in integrating technology into their classrooms and planning, instructional technology resource teachers and mentors will specifically address the following principles in their work:

They will be responsible for working with local district and school instructional leaders and technology staff to develop, promote and implement the integration of technology into the curriculum and assessment. They will develop, coordinate and implement professional development, which integrates technology into the curriculum. They will work collaboratively with central office and school-based personnel to use technology and include technology applications as an integral part of the total instructional program.

Among their specific responsibilities will be the following:

- Develop model curriculum units. Working with teachers to implement these units, the results will be several top-quality units, which have been tried and perfected, which can be used by teachers throughout the Commonwealth. These units will be exemplary in terms of the highest curriculum standards and the best technology integration and will be produced through collaboration with the Office of Academic and Professional Development and teachers in the field.

- Develop, identify, coordinate, and conduct professional development in the areas of technology integration into the Kentucky Academic Expectations, Core Content, and Program of Studies.

- Identify and develop effective professional development programs and modules, both virtual and real. Collaboration with the Professional Development Matrix Team, staff members responsible for Consolidated Plan development, and other entities in the Department of Education will be a key part of this process.

- Model Kentucky's new technology standard for teachers.

- Assist in the identification of instructional software for teachers

- Model the integration of technology in all curriculum areas.

- On a regional basis, they will assist teachers in developing curriculum materials and specific lesson plans, which utilize technology. Assistance may take the form of teaching model lessons, team-teaching, working with groups in unit development, and sharing proven units with others.

- Conduct research on the most effective uses of technology and make the results easily available to practitioners.

Shared Services: Strategic Resource Management and Financial Stewardship

The 2001 – 2006 Master Plan for Education Technology carries forward the concept of shared services at the state and district level as introduced in the 1998 Update. The provision of shared services is based on the proven concept that aggregating need and leveraging that need as the basis of procurement will substantially reduce costs and secure higher levels of associated services, such as warranty and maintenance. Similarly, service delivery structured on aggregated need reduces administrative and staffing costs associated with delivery and support of those services over time.

The Master Plan calls for the use of shared services as a resource management strategy at both the state and district levels, and the budget is aligned accordingly. For instance, the total cost to the education technology program for 1-800 Help Desk would be about ten to fifteen times more if each district contracted for those services independently. In fact, some districts because of their geographical location would simply not be able to find a responsive vendor and the schools would lose the service entirely. The same can be said for engineering and instructional consulting services that are provided on a regional basis to the districts from the state-level, and for related services that may be provided from the district to the schools.

Gartner Group data indicate that the education and government sectors typically allocate 6% of their entire budget for maintaining information technology infrastructure operations, maintenance, and incremental replacement. That figure would be much higher if the concept of aggregating need to deliver shared services were not employed.

After Hour Access: The Digital Divide In Kentucky's Homes and Communities

Given the fact that access to technology in the home and in the general community is scarce in Kentucky, computer and Internet access within public schools has to figure prominently in the state's attempt to protect its young people from being held back because of the "digital divide." In fact, it is becoming generally accepted that access to information technology has a direct influence on economic success:

> "Research shows that because information technology permeates so many aspects of our lives, access to and use of it appear to be preconditions for anyone becoming politically informed, socially integrated, and economically successful in the Information Age . . . . Ample evidence suggests that access to computers and information networks has broad economic benefits for workers. Using a statistical model to examine the relationship between wages and computer use, our estimates show that wages are higher in businesses that use computers. (10) According to these estimates, workers in businesses that use computers earn 10 to 20 percent more than workers in comparable businesses who do not use computers. This finding is consistent with other studies reporting that technology use on the job raises the earnings of workers. (11) At least one national study estimates that workers who use computers earn about 10 to 15 percent more than workers who do not. (12) Consequently, barriers to technology use may limit access to better-paying jobs. "
>
> (The Leadership Challenge Ahead, Kentucky Long-Term Policy Research Center)

The following graphic from The Leadership Challenge Ahead depict quite clearly that Kentucky homes generally have less access to computers than those in surrounding states:

This same report contains compelling data about adult access. The data indicate gains in access are occurring because households are buying computers - - not because computer access is more widely available from the local school or in the community. This is again problematic for low poverty households:

> "Two years ago, we found that 32 percent of surveyed adults in Kentucky said they had a personal computer in their homes, and another 33 percent did not have a computer at home but had access to one at work, at school, or elsewhere (Figure 3). Thus, a total of 65 percent of adults in Kentucky had access to a personal computer somewhere. In a survey completed in the spring of 1998, we found that the share of adults with a computer at home had risen from 32 percent to 41 percent. However, the share of adults with access to a computer anywhere had barely changed, from 65 percent to 68 percent, suggesting that more of those who had access to a computer outside the home two years ago now have their own computers."

Finally, the digital divide appears to be impacting one region of the state more than any other:

> " . . .Regional disparities in Internet use have virtually disappeared, with the exception of eastern Kentucky, which continues to lag behind the rest of the state (Figure 4). Low Internet use in eastern Kentucky may be explained by lower rates of home computer ownership. Computer users at home are more likely to have accessed the Internet than computer users at work, school, or elsewhere."

In summary, if on average only 40% of Kentucky homes have computers and data indicate that access to technology and advanced telecommunications in the schools is equitable, the best opportunity for most Kentuckians to access technology will be in their local schools. Most people live within 5 miles of a school. We need to address the ways in which we can make all this happen. In light of the relative paucity of technology in Kentucky homes and workplaces and the equitable and prevalent access to technology in the schools, it seems imperative that the state find ways to increase access to school technology after hours for the general citizenry, teachers or students. For example a replaced worker, teacher or student that is trying to retool or improve their skills needs access to the Virtual University/High School/ Library to take

vocational or academic courses during nonschool hours during the week or weekend. The KTLN facilities should be available for these purposes as well.

"An Economy That Values Brains Over Brawn"

This phrase, borrowed from "Chapter 1 The Rise of the Wired Community," in The Leadership Challenge Ahead, published in1999 by the Kentucky Long-Term Policy Research Center, recalls an important aspect of the vision of the original Master Plan for Education Technology. The original Master Plan, and the subsequent Updates, have explored this issue of education technology as a catalyst to create powerful partnerships between education reform, economic development, workforce preparation and adult literacy. This is still a major objective for the next 6 years.

Consider this excerpt:

> "As implementation of the reform proceeds, Kentucky businesses will be able to recruit a workforce from students who have gone through their entire education career using a wide range of technologies. In today's economy, the better paying jobs increasingly require both basic literacy and technology literacy. In the early 1990's, workers with computer skills were earning about 15% more than workers without, nationally. It is estimated that by the year 2010 sixty percent of the new jobs will require skills possessed by only 22% of today's workers. Kentucky's students, given access to education technology in every classroom, will therefore be more competitive as they search for jobs. Kentucky's businesses, and the communities in which they are located, will become more competitive as Kentucky's public school graduates employ the tools of technology to bolster existing businesses and create new ones."

The critical need for a strong strategic alliance between public policy that guides educational use of technology and public policy that guides economic development becomes clearer each year. The Long-Term Policy Research Center notes that:

> " . . .Workers in businesses that use computers earn 10 to 20 percent more than workers in comparable businesses who do not use computers . . . .At least one national study estimates that workers who use computers earn about 10 to 15 percent more than workers who do not. Consequently, barriers to technology may limit access to better-paying jobs."

The same report states "the fastest growing occupation group in Kentucky to the year 2005 is projected to be computer, mathematical and related occupations." The Center emphasizes that a new workplace paradigm has emerged and that "it is increasingly important to prepare people for the world of work, where learning will be continuous, analysis and problem solving integral, and critical thinking imperative."

In a related study, "Kentucky's Digital Divide Among Widest in Nation, " the Long Term Policy Research Center made a strong statement about the need to improve technology competency levels as a critical success factor for economic growth:

> While we have taken bold steps to improve education, expand access to technology, and strengthen the state's university research centers, the payoff will not likely be realized for many years to come. In the interim, our approach to economic development must become far more forward-looking. To do so, policies must recognize the decline of the manufacturing sector as a source of employment and the corresponding ascendance of

> today's technology-driven economy; recognize the critical importance of innovation and entrepreneurship; and cultivate opportunities linked to rising income levels. In the Information Age, Kentucky will be at a competitive disadvantage if the access gap is not closed. We must pursue educational and development strategies to catch up with the rest of the nation."

In "Rethinking Kentucky: a New Vision for the Coming Millennium, " Ernest J. Yanarella, writing for the Center, makes it quite clear what the long-term consequences of not addressing this issue could be:

> "In the new world of work that Kentuckians of this and future generations will face, Shoshana Zuboff has asked a fundamental question: "Are we going to have smart people or smart machines?" . . . Where will Kentucky workers stand in relation to these continuous changes in the workplace, the office, the college classroom, the world of business and finance? Will our economic policies grow the kind of high-technology businesses that will foster an environment of entrepreneurship and innovation in the Commonwealth? Will they become smart workers for whom the old meaning of machines as tools will become the norm and whose products will be invested with value added by their creativity and brainpower? Or will we remain content to see native Kentuckians minimally trained to build other country's products on other company's technology, while watching the bulk of profits go to other people's corporate headquarters?"

There are two things Kentuckians have control of to improve our economic competitiveness. The first is helping our existing businesses that are ready by supplying them technology skilled graduates. The second is developing our own entrepreneurs. A state's economic health is usually proportional to the number of entrepreneurs it has. As a state we rank very low in both of these. The third way to improve or economic standing is to attract businesses seeking a location to relocate that has a low cost of living, high quality of live, good infrastructure and large pool of high skilled workers. Hopefully this is something that we can benefit from during the next 6 years.

An analysis of adult technology use in Kentucky today illustrates the need for policies that will reverse the inequities that exist today for most Kentuckians during the next decade; that is, the onset of the digital divide growing between sectors of the population. In many cases the most advanced technology system in most Kentucky communities is the school system. The communities around these school's need to also become part of the information age so they can take advantage of the newly acquired skills of graduating students. A concern is if a new graduate goes into a workplace that prefers not to use technology tools to gather information, communicate, produce products or increase efficiency, then they may leave these Kentucky communities to seek employment that does use them and usually pays more for these skills. An area of focus during the next 6 years is to work with local governments and businesses to assist them to move in parallel with the technology progress of the schools around them. We also will be working with the STLP students and mentors if an effort to develop Kentucky technology entrepreneurs that will start their own business throughout communities in the state.

The U.S. Department of Commerce found in 1997 that only 30% of Kentucky households had a computer, and not all of those had Internet access. While that figure is higher today Kentucky still has a lower percentage when compared to the progress in homes of other states.

An analysis of Internet use among adults in Kentucky by education level illustrates again that the persons most vulnerable in the new economy are those who are least likely to have access to a computer and the Internet for re-training or learning new skills.

The Long-Term Policy Research Center also found that certain regions of the state are less likely to have access to technology in the home or at work.

This rather bleak picture can be contrasted with the situation that has developed in Kentucky's public schools which was highlighted earlier. In Kentucky today, geographic local, minority status, and relative wealth or poverty do not determine the extent to which young Kentuckians have access to or the frequency with which they use technology to learn and solve problems. While technology is still not integrated into the curriculum systemically, Kentucky's public school students may rapidly be developing more advanced computer skills and be more technology literate than their counterparts in other states because the equity and access provisions of the Master Plan are working.

The criticality of raising the technology literacy of our students, and of all our students, is argued strongly by Chris Dede, professor in the Schools of Education and Information Technology and Engineering at George Mason University:

> "Children also need to master higher-order cognitive, affective, and social skills not central to mature industrial societies but vital in a knowledge-based economy. These include "thriving on chaos" (making rapid decisions based on incomplete information to resolve novel situations); creating, sharing, and mastering knowledge by filtering a sea of quasi-accurate information; and accomplishing tasks via collaborating with a diverse team -- face-to-face or across distance. These are no longer capabilities that only "gifted and talented" students need to master; sustaining prosperity and justice in a knowledge-based economy governed by democratic political methods requires that all citizens in our society be adept in these higher-order skills.
>
> We have the technical and economic capabilities to develop technology-rich learning environments for children that prepare them for life as adults in a world very different than we have known. Whether we have the political and cultural will to accomplish innovative, equity-enhancing shifts in learning and schooling remains to be seen. "

In the 1999 State New Economy Index, published by the Progressive Policy Institute, Kentucky ranked 6th in the nation for the indicator "Technology in the Schools as a Factor for Economic Development" "Technology in the Schools" was, in fact, the top ranking the state received.

Resources Required for 2001 Through 2006

Unmet Need Categories and Funding Levels

For the years 2000 through 2006, the Department is proposing a complete restructuring of the Master Plan Budget along four new basic categories of unmet need:

- Operations
- Maintenance
- Incremental Replacement
- New Technologies

Of the four categories, expenditures in Operations and Maintenance are absolutely necessary to sustain current levels of service. That is, if unmet need within the Operations and Maintenance categories is not reduced in accordance with program guidelines the integrity, sufficiency, and capacity of the district technology infrastructure will degrade until services are seriously curtailed or eliminated.

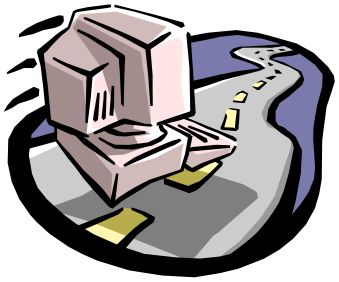
The unmet need for Incremental Replacement constitutes a framework for replacement of various technology components on a scheduled basis over time, in accordance with the life cycle of each item or service.

How do we keep up with changes in Technology with Hardware and Software?

Current inventory is outdated resulting in breakdowns, slow response time, and outdated software.

Incremental purchases over the next 6 years will result in . . . . .

Faster machines and updated software that will prepare Kentucky students for their future.



The unmet need for New Technologies includes products and services that are more discretionary in nature, products and services that are today only marginally available or affordable, and products and services which are perceived as needs in the third or fourth year of the planning horizon.

Three levels of expenditure are proposed:

- School Expenditures
- District Expenditures
- Shared Service Expenditures

A summary of expenditures and their categorization:

Category	**Operations**	**Maintenance**	**Incremental, Cyclical Replacement**	**New Technologies**
School Expenditures			Workstations Printers File Servers Wiring Network Components Software Multi-Media Applications/Service Phone Systems	Additional Modules/ Student School Mgmt and Administration

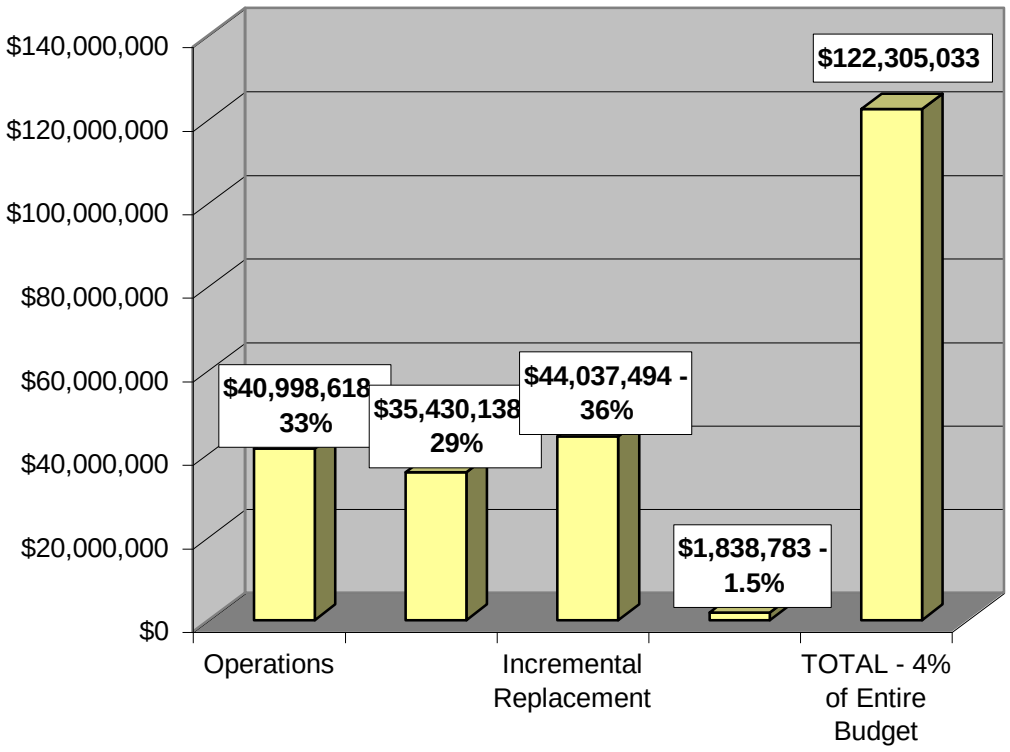
District Expenditures	Technology Leadership STLP Leader and STLP Support Data Communications Service Professional Development	Student Hardware School Hardware District Hardware Network Hardware Software Updates and License Fees	Workstations Printers File Servers Wiring Network Components	Desktop LAN Mgmt Software
Shared Services	Help Desk Internet Electronic Mail Distance Learning Enterprise Database Instructional Professional Development Procurement Mgmt and Support Student Technology Leadership Enterprise Program Management	Instructional and Administrative Software Licenses		Additional Modules/ Shared Financial Mgmt. Systems

The total projected unmet need throughout these four categories is projected to be $122,305,033 annually, which is distributed as follows.

Category of Unmet Need	Total	% Of Total
Operations	$35,430,138	29%
Maintenance	$40,9998,618	35.5%

Incremental Replacement	$44,037,494	36%
New Technologies	$1,838,783	1.5%
All Categories	**$122,305,033**	**100%**

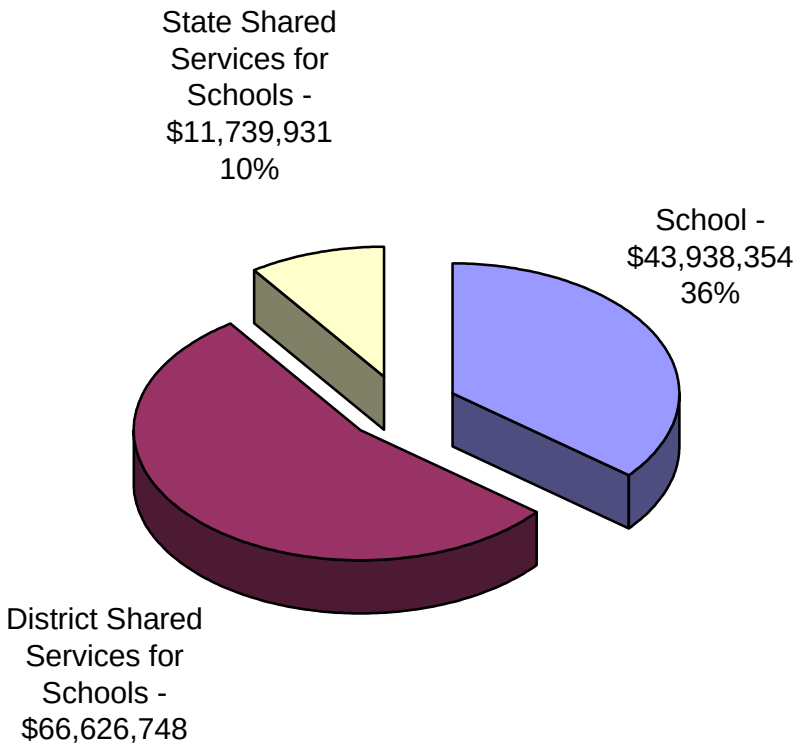
Annual KETS and Technology Budget by Functionality



Among the three expenditure levels, these projected annual costs break out as follows:

Expenditure Level	Total	% Of Total
School	$43,938,354	35.9%
District	$1,638,723	1.3%
Shared Services (District)	$64,988,024	53.1%
Shared Services (State)	$11,739,931	9.6%
All Categories	**$122,305,033**	**100%**

Technology Expenditures by Organization



Proposed Technology Investments as a Portion of the Total Education Budget

Assuming a $2.9 billion dollar total annual education appropriation, the funds projected for the total annual unmet technology need may be expressed as:

$122,305,033 Total Funds Required for Technology Tools & Services

- $214 per student per year, or
- $17 per month, or
- $.89 per day per student, or
- 4.22% of the total education appropriation

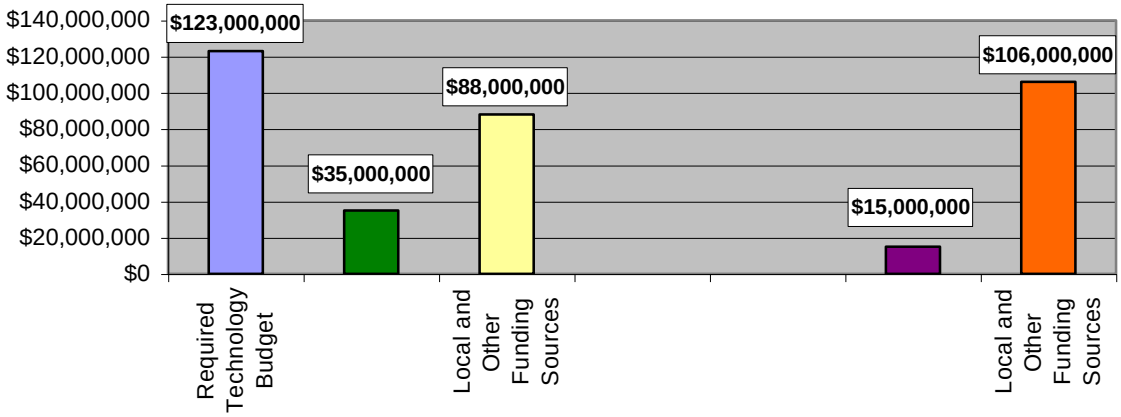
State Services and State Provided Funds - $2,900,000,000

- Average Funds Available Per Student for All Educational Programs - $5,085
- Cost for Technology Tools and Services - $214
- % Of Total State Funds Required For Technology - 4.22% State Funds

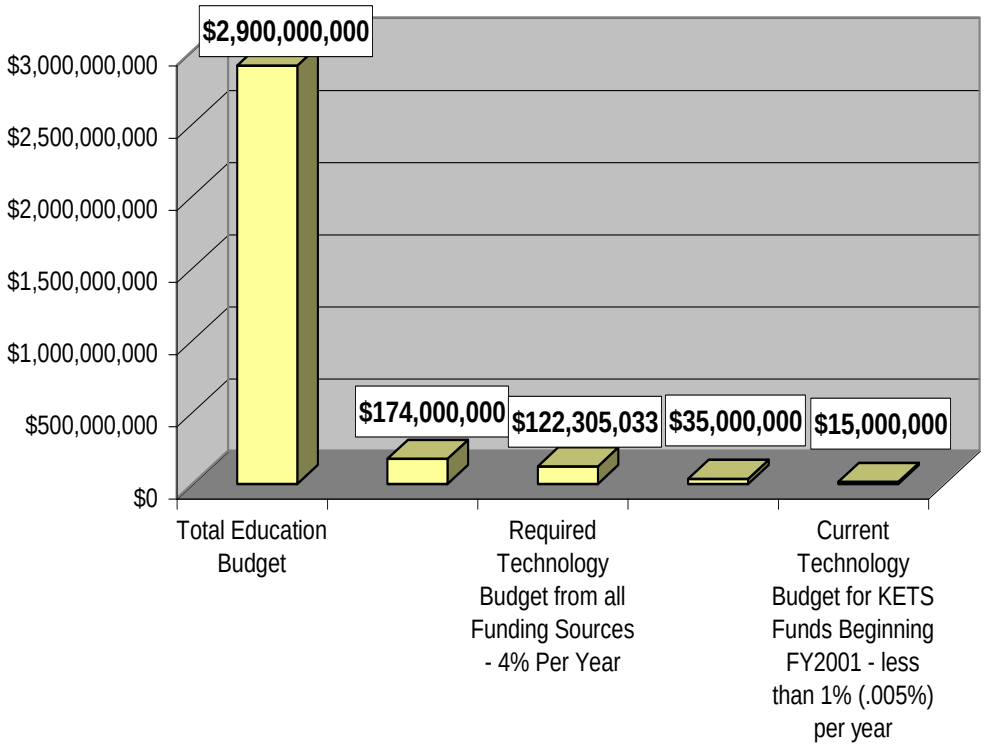
Combined with Local Taxes, Federal Funds - $3,277,000,000

- Average Funds Available Per Student for All Educational Programs - $5,747
- Cost for Technology Tools and Services - $214
- % Of Total State Funds Required for Technology – 3.73%

KETS and Technology Funding Required To Sustain Excellence (Per Year)



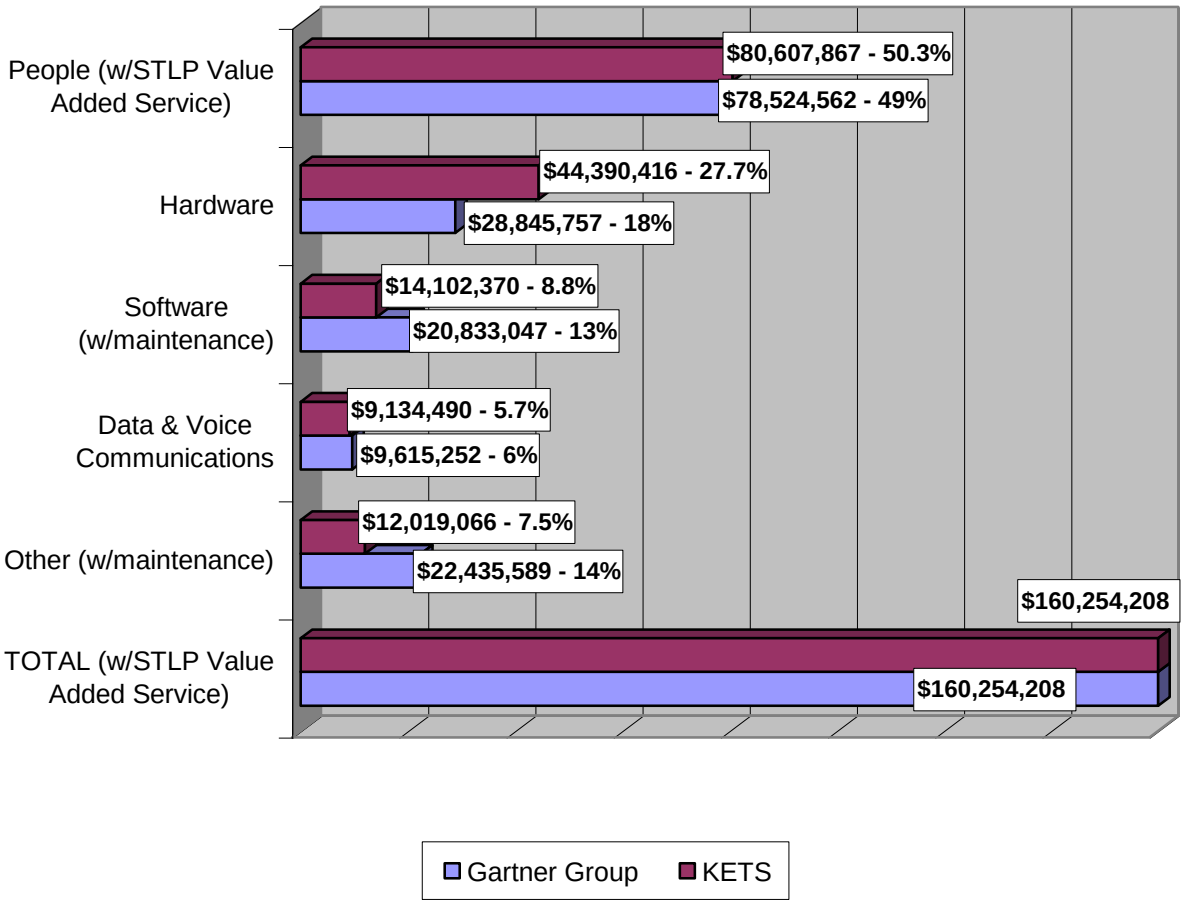
Estimated Requirements of Technology Budget Per Year



While these figures reflect the Department's best estimates of true cost of the unmet need, it is highly unlikely that funds to address the total unmet need will be made available in any given year through the offers of assistance. Districts will be responsible, as they are today, for prioritizing resource allocation and leveraging all possible sources of funding.

As Master Plan implementation has proceeded, more components have been integrated into the overall design and experience has yielded good data on which more realistic projections of life cycle and maintenance costs can be made.

Annual Technology Costs by Category



Funding Sources Available

The 2001-2006 Master Plan anticipates the need for schools to supplement state technology funding from other sources more than ever before. The following will need to be identified as potential funding sources:

- Chapter 2
- Special Education Funds
- Perkins/Vocational education
- Other Federal education programs (Chapter 1, Eisenhower Program)
- Foundation grants
- Federal grants (e.g., TLCF, savings from e-rate)
- Funds from local taxes
- Private donations
- Corporate grants
- Seek funds (i.e., setting aside a certain portion of this for technology operations/maintenance/incremental replacement)

Key Points: New Concepts and Highlights of the 2001 Through 2006 Master Plan Budget

Fund Sources

- In addition to "S" for State Shared Services, "L" for Local Funds, and "S/L or L" for expenditures which may be procured with EdTech or Local Funds. A newly introduced funding source "F" designates a fund source of "Facilities" and eliminates the potential for duplicative funding from two programs for new data, voice and video wiring on construction projects.

Assistive/Adaptive Technology

- In consultation with the Division of Exceptional Children, the manner in which unmet need for assistive/adaptive technology is calculated has been changed. The need is now calculated based on counts of Individual Education Plans. The purpose of this change is to make KETS funds more accessible to this population.

Professional Development

- The professional development line item (Proficiency Training) is increased from $100 per teacher per year to $250 per teacher per year. These funds may be spent on more professional development activities, on the salary of a technology resource teacher, and on other products or services, which support the informed use of instruction to improve student learning.

School Shared Multi Media Applications and Services

- This new category includes presentation devices, scanners, digital cameras, portable TV's, KTLN, desktop conferencing and a variety of other multimedia devices and materials. EdTech funds may be used for these items.

Shared District Desktop and LAN Management Software

- This new category includes Desktop and network management applications. EdTech funds may be used.

District Daily Operations

- An unmet need for two district technology leadership staff is established. The district CIO (Chief Information Officer) is the person identified as having the primary responsibility of leading a district technology program. EdTech funds may be used.

- TELCO Data Line costs may be funded with EdTech funds. This line item identifies the school to district hub high-speed data circuits to connect schools. This is not the state to district data line that connects every school district. The state to district data line is 100% state funded.

- TELCO Voice Lines are identified as a locally funded line item ("L"). This is a daily operation to support the classroom telephone dial tone.

Maintenance

Hardware Maintenance

- Costs associated with hardware maintenance and repair are EdTech fundable. Districts may fulfill this need through internal hiring or outsourcing. This is the break-fix component of hardware.

Software Updates

- The use of EdTech funds for software license fees and updates has been expanded to include new categories. In today's ever changing world of technology it is very important to have annual software agreements that provide the following types of advantages: 1) License and access to the latest code version releases. 2) Bug fixes. 3) End user support in the form of online and telephonic help desk. Many software vendors have annual maintenance at a fraction of the original cost.

Incremental Replacement

- This is defined as the replacement of existing technology hardware and infrastructure over a period of time. Today KETS has a 6:1 ratio of student workstations and a 1:1 ratio of teacher workstations. In the next 6 years this entire inventory will need incrementally replaced or refreshed to maintain a level of modern proficiency.

Shared Services

- The 2001-2006 Master Plan Budget for Education Technology identifies and breaks out cost for both District and State shared services. The provision of shared services is based on the proven concept that aggregate need and leveraging that need as the basis of procurement will substantially reduce cost and secure higher levels of associated services, such as warranty and maintenance.

Statutory Authority and Responsibility

The Master Plan for Education Technology

KRS 156.666 establishes the Council for Education Technology as an advisory group to the Kentucky Board of Education. The Council was responsible for developing the Master Plan for Education Technology.

Approval and Update of the Master Plan

The Kentucky Board of Education and the Legislative Research Commission shared initial approval authority for the Master Plan pursuant to KRS 156.670(1).

KRS 156.670(7) places responsibility for updating the plan, as necessary, with the Council and the Board. Updates are to be reported to the Legislative Research Commission.

Standards

KRS 156.160(1) stipulates that the Kentucky Board of Education has a statutory mandate to prescribe standards, which school districts shall meet. Among these are standards for the "acquisition and use of educational equipment for the schools as recommended by the Council for Education Technology," (KRS 156.160(1)(b).

KRS 156.670(3) states that the Master Plan shall "establish and implement a uniform and integrated system of standards and guidelines for financial accounting and reporting which shall be used by all school districts."

KRS 156.670(4) requires that the education technology system provide 'comprehensive, current, accurate, and accessible information relating to management, finance, operations, instruction, and pupil programs which are under the jurisdiction of the Department of Education.' The Chief State School Officer must certify these data to support administration of the Fund to Support Education Excellence, which provides funding to support the public school system in accordance with KRS 157.330. The guaranteed base funding level for each district is computed based on the prior year's average daily attendance (KRS 157.360(1)) which is calculated based on data collected within the school and accumulated at the district level. To support this funding process, the Kentucky Board of Education has the obligation and authority to establish standards for administrative systems at the district and school level, including, but not limited to, uniform codes, processes, and software systems.

The statutes do not restrict the standards-setting responsibilities noted above to any particular source(s) of funds. The Kentucky Board of Education, therefore, has the authority and obligation to specify standards for education technology to which school district acquisitions of hardware and software are subject regardless of source of funds. The Board therefore may specify, as it deems necessary, a standard for any line item in the Master Plan budget.

These standards are set forth in the Master Plan for Education Technology and incorporated by reference into the Kentucky Administrative Regulations pursuant to 701 KAR 5:110 and in compliance with KRS 156.160(1).

Districts are required by Kentucky Administrative Regulation 701 KAR 5:110 to procure only those technologies which meet KETS standards, if a standard for that category has been established, regardless of source of funds.

Education Technology Trust Fund

The Education Technology Trust Fund is established in the Finance and Administration Cabinet by KRS 157.665(1) to provide education technology for the public school system.

Funds are appropriated to the Trust Fund in each biennial budget. All interest earned on money in the fund is retained for reinvestment in the fund. All money credited to the fund, including interest, is to be used for education technology as defined by the Kentucky Board of Education's Master Plan and does not lapse (KRS 157.665(2)).

The School Facilities Construction Commission, within the Finance and Administration Cabinet, is responsible for distributing state funds to local districts through the education technology-funding program (KRS 157.650).

To participate in the education technology funding program, a local public school district must have an unmet technology need described in the district technology plan and approved by the Kentucky Board of Education (KRS 157.655(1)).

The base level of assistance to each district is determined by dividing the total amount available in the Trust Fund by the total of the prior year's average daily attendance of the eligible districts times the individual district's prior year's average daily attendance (KRS 157.660(1)).

Funds transferred to districts are to be used only for the projects included in the district's technology plan (KRS 157.660(2)).

Trust funds are transferred to local districts after the district's need for assistance has been certified by the School Facilities Construction Commission. All other expenditures from the fund require the approval of the Kentucky Board of Education (KRS 157.655(3)).

Calculation of Unmet Need

Any technology procured or secured by a district, in a category for which a Kentucky Education Technology System unmet need standard is established, regardless of whether the item is used to reduce the unmet need or not, must meet or exceed the KETS standard in compliance with 701 KAR 5:110.

Any technology procured or secured by a district, in a category for which a Kentucky Education Technology System unmet need standard is established, regardless of whether the item is used to reduce the unmet need or not, must be included in the District Technology Plan as inventory.

Components for Which Standards Have Been Established

Workstations

Intel Workstation/Stationary/Level I

Motorola Workstation/Stationary/Level I

Intel Workstation/Stationary/Level II

Motorola Workstation/Stationary/Level II

Intel Workstation/Stationary/Level III

Motorola Workstation/Stationary/Level III

Intel Workstation/Portable/Level II

Motorola Workstation/Portable/Level II

Intel Workstation/Portable/Level III

Motorola Workstation/Portable/Level III

Optional Monitors

Printers

Level I Dot Matrix

Level II Dot Matrix

High Speed Dot Matrix/Level I and II

Color Compatible Dot Matrix

Level I Line Printer

Level II Line Printer/Level III

Level I Inkjet Monochrome

Level I Color Capable Inkjet

Level II Color Capable Inkjet

Level I Laser

Level II Laser

Level III Laser

Level I Color Capable Laser

CD/ROM

Fileservers/Level I, II, and III

Network Components

Routers

Network Concentrators

Network Interface Units

Network Interface Cards

Network Computing Services

CSU/DSU's

Network Switches

Modems

Telco Data Lines (e.g. KIH)

Telco Voice Lines

Building Wiring (incorporates EIA/TIA standards)

Work Area Wiring

Horizontal Wiring Subsystem

Building Backbone Subsystem

Campus Backbone Subsystem

Power Wiring

Installation Standards

Dial-up Routers

Dial Up or Telecommunication Routers

Software

Network Operating Systems

Operating Systems

Relational Database Systems

Office Products (Word processing, spreadsheet, calendar, graphics, end-user database)

Electronic Mail

Internet Browser

Remote Access Software

Proxy Software

Network Management Software

Desktop Management Software

Instructional Software

The Kentucky Education Technology System does not establish specific standards for instructional software. KETS has developed guidelines in the form of a checklist for educators to use during software selection. Instructional software must run, however, on KETS standard hardware in a KETS-standard network environment.

To secure discounted pricing KETS does issue competitive solicitations and establish price contracts for the most popular instructional software products.

Applications

District Financial Management and Administrative Management

School Student Management

District Level Accumulator

Online Instructional Software Review Service

Television Monitors

Help Desk Services

Maintenance Services

Multimedia Applications and Services

Distance Learning

Kentucky Virtual High School (KVHS)

Kentucky Telelinking Network (KTLN)

Kentucky Virtual Library (KVL)

Kentucky Education Television (KET)

Kentucky Virtual University (KVU)

Proficiency Training

Assistive and Adaptive Technology

Enterprise Database

Instructional & Administrative Technology Integration Leadership Standards

STLP Standards

Telephone Systems