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ABSTRACT

This plan provides a framework for incorporating technology into the educational lives of Mississippians. The recommendations set forth are based on the comprehensive needs analysis and statewide study of existing educational technology initiatives conducted by the Center for Educational Leadership and Technology in the spring and summer of 1995. This document contains a brief explanation of the planning methodology, key findings and recommendations from the Interim Report (June 1995) and design principles and implementation strategies for the integration of technology into the Mississippi educational system for the next 5 years. The plan is divided into 10 major sections: (1) curriculum improvement and technology integration strategies/changing nature of curriculum; (2) education technology system design; (3) education accountability and reporting system design; (4) learning environments and facility planning; (5) distance learning; (6) professional development plan; (7) education technology policy and procedures; (8) technology standards and procurement strategies; (9) roles and responsibilities, staffing positions, and organizational structure; and (10) program monitoring and evaluation plan. The plan also discusses local technology planning; funding issues and strategies; implementation staging and phasing; and multiple viewpoints on the benefits of a statewide plan for educational technology. Changes in teaching, learning, and management that may be expected as a result are highlighted. (AEF)

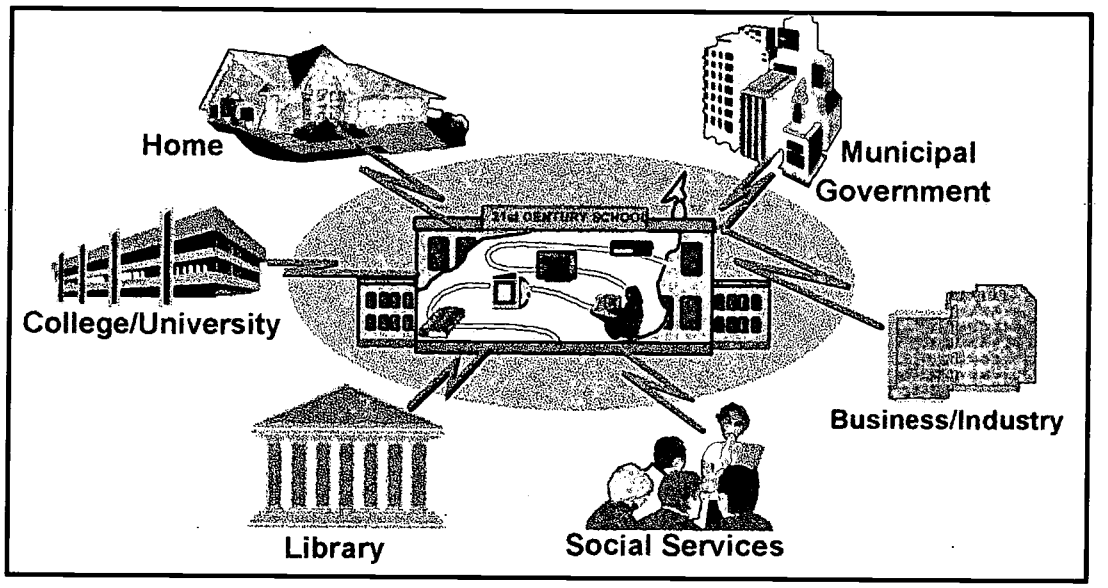
MASTER PLAN FOR EDUCATION TECHNOLOGY

MISSISSIPPI

Council for Education Technology
October, 1995

Mississippi

Master Plan for Education Technology



Final Report

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PREFACE

In 1994, the Mississippi Legislature passed landmark educational legislation entitled the Education Technology Enhancement Act, Senate Bill 3350. This bill calls for the developmentof the *Mississippi Master Plan for Education Technology*. Senate Bill 3350 requires a five-year plan that will outline activities related to purchasing, developing, and using technology to:

- provide access to individualized instruction through computer-based technology, video and other technology-based instruction
- improve teaching and learning and the ability to meet individual students' needs to increase student achievement
- improve curriculum delivery to help meet the needs for educational equity across the state
- improve delivery of professional development
- improve the efficiency and productivity of administrators
- encourage development by the private sector and acquisition by districts of technologies and applications appropriate for education
- ensure efficient and equitable use of technology at all levels from primary school through higher education, including vocational and adult education.

To this end, Senate Bill 3350 also established the Council for Education Technology (CET) as the advisory group which, in cooperation with the Mississippi Department of Education (MDE), is charged with the responsibility of creating the *Mississippi Master Plan for Education Technology*. Membership in the Council includes representatives from public education as well as private business and industry.

To accomplish the tasks defined by Senate Bill 3350, the Council for Education Technology and the Mississippi Department of Education solicited help from two arenas-practitioners who educate Mississippi's population daily and professionals with extensive experience in state technology planning. The practitioners comprise a small group of educators called the Project Advisory Committee and were appointed by the Council to assist in this effort. To involve experienced professionals in state technology planning, the Mississippi Department of Education contracted with the Center for Educational Leadership and Technology (CELT), a not-for-profit research and development corporation with headquarters in Marlboro, Massachusetts, that has worked with numerous other states in technology planning. CELT had the primary responsibility for conducting a thorough assessment of current education technology initiatives and facilitating the development of the *Master Plan*. Council and Committee membership information may be found on the preceding two pages.

Input required for plan development has been gathered from all available sources using a variety of mediums over a period of ten months. Primary information sources include Mississippi students, parents, teachers, administrators, community members, superintendents, legislators, professors, and governmental agency leaders. Data collection methods employed were paper surveys, personal interviews, focus group discussions, telephone conversations, public hearings, and electronic teleconferences.

The *Mississippi Master Plan for Education Technology* represents the collective efforts of Mississippians statewide. The writing teams for the plan were comprised of educators from the ranks of teachers, administrators, and university professors, Council for Education Technology members, Mississippi Department of Education staff, and the Center for Educational Leadership and Technology staff. (For a complete listing of writing team members see Appendix A.)

It has been stated many times during the development stages that planning is an ongoing process that does not end when the document is published. Indeed, the initial plan is just a beginning. **The Council for Education Technology, the Project Advisory Committee, the writing teams, the Mississippi Department of Education and the Center for Educational Leadership and Technology ask that this plan be regarded as a first step toward the creation of a future for Mississippians in which all students have access to the best educational resources. This document is an action plan that must continue to be revised, changed, and updated in a cycle of continuous improvement to fit the changing needs of Mississippi learners.** Margaret Mead, famous anthropologist, eloquently expressed it in this manner: "We must educate our children in what no one knew yesterday and prepare our schools for what no one knows yet." Although this quote was first articulated over 40 years ago, it is even more relevant today.

This *Mississippi Master Plan for Education Technology* would not have been possible without the efforts of many hundreds of Mississippians who gave of their valuable time and talents to make this plan a reality. Special thanks goes to the Council members, advisory committee members, writing team members, and consultants from CELT who dedicated themselves to this project.

EXECUTIVE SUMMARY

> *The hardest step to educational reform seems to be the part that costs nothing - vision.*
>
> - David Thornburg (1991)

The Mississippi Board of Education, the Mississippi Department of Education (MDE), the Council for Education Technology (CET), the Department of Information Technology Services (ITS), and the Center for Educational Leadership and Technology (CELT) present this *Master Plan* to the citizens of the state of Mississippi. The plan provides a framework for incorporating technology into the educational lives of Mississippians. It is the result of a partnership forged among state and local educational leaders in the K-12 arena, the Institutions of Higher Learning (IHL), the State Board for Community and Junior Colleges (SBCJC), the Mississippi Library Commission, the Mississippi Department of Information Technology Services (ITS), the Mississippi Authority for Educational Television (ETV), and a variety of other state agencies as well as business and community members who have provided valuable input.

The recommendations set forth in the plan are based on the comprehensive needs analysis and statewide study of existing education technology initiatives conducted by the Center for Educational Leadership and Technology in the spring and summer of 1995. Detailed results of that analysis are found in the Interim Report approved by the Council for Education Technology and the Mississippi State Board of Education in June, 1995.

Central to the intent of the legislative action and subsequent work of the Council has been the perception that as Mississippi makes advances in education it will be important to provide appropriate instructional technologies to support the attainment of school improvement results. Like all other states, Mississippi faces serious challenges in the quest for improvement in education. The passage of Senate Bill 3350 in the Mississippi Legislature demonstrated the commitment of legislative and executive leadership to use education technology tools as support mechanisms in the ongoing quest to educate all students and prepare them for successful careers. This is especially significant as the world shifts from the Industrial Revolution to an information-based, technologically-oriented society and economy. Technology support mechanisms are now widely recognized as critical elements that are vital to the success of efforts to improve student performance.

The *Mississippi Master Plan for Education Technology* contains a brief explanation of the planning methodology, key findings and recommendations from the Interim Report, as well as the design principles and implementation strategies for the integration of technology into the Mississippi educational system for the next five years. The plan is divided into 10 major sections. Each section is highlighted below with major recommendations noted.

Curriculum Improvement and Technology Integration Strategies/Changing Nature of Curriculum

- Office of Educational Technology will identify exemplary models of technology integration to help districts and schools develop their own curriculum integration plan.
- Offices of Educational Technology and Management Information Systems will develop a statewide database of curriculum integration resources including human and material resources.
- Office of Educational Technology will coordinate with other offices in the MDE to establish curriculum integration guidelines noting appropriate technologies for specific instructional purposes.

- Office of Educational Technology will promote statewide curriculum integration projects across disciplines through identifying model instructional settings.
- Office of Educational Technology will coordinate, with other offices in the MDE, the efforts to embed core technology competencies and teacher training models throughout the state curriculum structure.
- Office of Educational Technology will provide training opportunities in curriculum integration strategies for educators at all instructional levels, elementary, middle, and high school. Likewise, models will be identified that demonstrate the changing roles of teachers and students. Professional development training opportunities that focus on enabling teachers, administrators, parents, and school board members to be comfortable in these ever-changing learning environments will also be offered.

Education Technology System Design

- The Institutions of Higher Learning, State Board for Community and Junior Colleges, Mississippi Department of Education, Mississippi Educational Television, Mississippi Library Commission, and Mississippi Department of Information Technology Services are committed to work together to ensure interoperability and network interconnectivity that will enable effective, efficient, and economical networking without duplication of services. Formal plans will be developed to ensure that the Council for Education Technology continues to provide ongoing coordination, management, policy recommendations, and accountability.
- An integrated network of frame relay and ATM is recommended as the wide area network for the State's educational community. The integrated network will provide the bandwidth and connectivity requirements necessary to serve the state's data and video applications.
- The Technical Specifications and Operational Capacities Subcommittee will be maintained under the Council for Education Technology. This committee will monitor emerging technologies, evaluate new technologies that could benefit education technology networking, and make recommendations to the Council concerning the technical aspects of the networks and the need for additional communications standards and capacity requirements.
- Special consideration by all involved state agencies will be given to coordination in the design, installation, and equipment procurement process, as well as continuing support of the statewide educational network. The entities will coordinate efforts to establish maintenance and support plans that consolidate services to reduce costs.
- The Institutions of Higher Learning, State Board for Community and Junior Colleges, Mississippi Educational Television, Mississippi Library Commission, Mississippi Department of Education, and Mississippi Department of Information Technology Services should work together to investigate interconnectivity options, and where needed, create a process to retain network interconnectivity and switching from a qualified telecommunications provider(s) to ensure effective, efficient, and economical networking without duplication of services.

Education Accountability and Reporting System Design

- Data collection, dissemination and reporting procedures throughout the state will conform to standardized electronic data transfer formats as defined by the MDE.
- The MDE will expand access to Internet for local districts to facilitate communication for reporting purposes as resources are available.

Learning Environments and Facility Planning

- A model for learning environments for school facilities will be developed by the MDE to serve as a guide for equipment selection, installation of equipment and networks, facility renovations, and ergonomic considerations.

Distance Learning

- All school districts in the state will have access to a variety of distance learning resources.
- School districts will define specific distance learning needs and strategies in their local technology plans.

Professional Development Plan

- Graduate level courses, university courses, and community college-based courses in technology should be made available for teachers through both campus-based and technology-delivered systems at affordable prices. The MDE should work with other agencies to ensure that, in the absence of university credit, Continuing Education Units (CEUs) will be awarded for participation in these courses.
- The MDE Office of Educational Technology, with the help of local districts, will identify and train a group of lead technology teachers to build a base of expertise throughout the state.
- Regional Resource Centers for Education Renewal and Enhancement should be established across the state to provide technology inservice and professional development for teachers, networking consultation, technical support, and other related services to schools and school districts.
- Technology professional development will be delivered via a variety of technological mediums, such as interactive video and computer-based online instruction, as well as more traditional training models.

Education Technology Policy and Procedures

- The CET and the MDE will coordinate the development and dissemination of model information policies related to technology and telecommunications. Some of the technology policy issues to be addressed include but are not limited to: telecommunications access, security, ethics, privacy, intellectual freedom, confidentiality of data, software licensing and copyright, remote access, hardware and software upgrade and replacement, system interoperability, and acceptable use.
- The MDE will develop and update standards annually for technology such as hardware and software, networking, telecommunications, and educational facilities.
- The MDE will develop procedures for identifying model classroom practices that integrate technology into the curriculum.
- The MDE will provide policy guidelines for education technology issues to local districts.

Technology Standards and Procurement Strategies

The procurement process for educational classroom technology will focus on the standards-based hardware/software and network configuration model outlined by the Mississippi Department of Education and the Department of Information Technology Services. In compliance with Senate Bill 3350, the procurement process will:

- furnish schools with technical guidance and assistance in complying with the legal bid requirements of state purchasing laws for information technology

- maximize the compatibility of educational information resources
- acquire complete information technology solutions that will be most beneficial to the schools at the best possible price
- leverage the state's combined purchasing power resulting in the best possible discounts for the schools and the state.

Roles and Responsibilities, Staffing Positions, and Organizational Structure

The infusion of education technology in the curriculum, classroom , and administration requires a different way of looking at traditional staffing patterns and the roles of educators at all levels. To cope with anticipated changes in teaching and learning, the MDE will provide new models for:

- leadership training
- staff organization (administrative and instructional)
- staff technical training
- inservice training
- business and community involvement

Models provided will include guidelines to districts concerning training and maintaining adequate and qualified staff and faculty, developing an infrastructure to meet current and future needs, sound financial planning for initial deployment as well as sustainability of effort, establishing a quality professional development program, and instituting an effective accountability system.

Program Monitoring and Evaluation Plan

- A comprehensive monitoring process for the *Mississippi Master Plan for Education Technology* will be implemented by the Office of Educational Technology .
- The *Master Plan* will be evaluated by the Council, the MDE and school districts on an annual basis.
- Local technology plans will be evaluated by the local school districts on an annual basis.

The *Master Plan* also contains three other sections that influence and are influenced by the components listed above: (a) local technology planning, (b) funding issues and strategies, and (c) implementation staging and phasing.

The role of local technology planning is critical to the successful implementation of technology into the educational setting. All districts interested in participating in the funding set forth in Senate Bill 3350 are required to develop technology plans. The guidelines and principles required for inclusion in these plans, as well as the process for approval of local plans, are outlined in *Section* 5 of this document.

The funding set forth in Senate Bill 3350 represents the initial investment in providing the resources for schools to restructure their educational systems. Section 6 of the *Master Plan* provides an analysis of the funding issues and alternatives to provide guidance to districts and promote equity and economy.

The key to the success of such an overwhelming task as the implementation of a five-year plan is a carefully crafted schedule of stages and timelines. Section 7 outlines the strategies for local and state planning and update schedules.

The final section of the *Master Plan* lends a perspective to the expected benefits of the completion of a statewide plan for education technology from several viewpoints. This section highlights the types of changes in teaching, learning, and management that may be expected to occur as a result of implementation over the next five years.

Table of Contents

Appendices

1. INTRODUCTION

1.1 Vision

The following vision statement was created by members of the Council for Education Technology and the Project Advisory Committee with input from educators throughout the state:

> *The infusion of education technology into Mississippi schools is integral to promoting higher order learning processes by students. The State of Mississippi is committed to ensuring that all learners have equitable opportunities to employ a variety of technological tools to enhance the learning process. We envision that education technologies are mainstays of the intellectual environment, maintaining the importance, independence and interdependence of individual learners in perpetuity. Education technology will provide the opportunity to offer education anywhere, any time for everyone.*

1.2 Mission of Education Technologies

The following mission statement was also created by members of the Council for Education Technology and the Project Advisory Committee with input from educators throughout the state:

The mission for using education technologies is to pursue supreme quality learning opportunities for all citizens. Toward this goal, the state of Mississippi will nurture a dynamic program designed to enhance, broaden, strengthen, and transform learning to produce:

- ¥ students prepared for a future workplace in which a key to success is the ability to access, interpret, analyze, and communicate information in a meaningful fashion
- ¥ teachers and students who become partners in learning, enjoying the benefits of mutually energetic discovery opportunities to the development of wisdom
- ¥ schools that are energized centers of learning, available to all members of the community for a vast array of functions.

1.3 Technology for Teaching, Learning, and Managing in 21st Century Schools

The 21st Century school is envisioned by Mississippi educators to be one that is more of an activity or state of mind than a place. The infusion of technology into the learning environment empowers citizens to use it as a teaching, learning, and managing tool. The following components, as stated in Senate Bill 3350, are essential to the transformation of learning environments and the implementation of the vision and the mission for Mississippi education in the 21st Century:

- ¥ an efficient, effective and equitable use of technology at all levels, including pre-school through higher education, vocational and adult education
- ¥ a well-planned and efficient statewide network of technology services designed to meet the educational and informational needs of schools
- ¥ an environment receptive to technology infusion in education throughout the state that accommodates connectivity and future growth and development
- ¥ the improved delivery of professional development

- ¥ a process that promotes district acquisition of technologies and applications to enhance student learning
- ¥ a climate that encourages the development by the private sector and acquisition by districts of technologies, and applications appropriate for education.

Within the new learning environment, new roles for **all participants** must be developed and nurtured. Students, teachers, administrators and communities will reshape their responsibilities around the changing learning environments of the future.

Students

The effective use of technology will require students to develop new roles in learning, living, and working. In order to become responsible citizens, workers, learners, community members, and family members in the new Information Age, students will need to be able to:

- ¥ navigate information
- ¥ think critically and analyze using technology
- ¥ create knowledge using technology, media, and telecommunications
- ¥ communicate effectively through a variety of appropriate technologies/media
- ¥ master technical abilities in order to interact with technology
- ¥ succeed as problem solvers, processors, and manipulators of information.

Teachers

The classroom must become a place where teachers create a learner-centered environment for students while maintaining their identities as teachers. The role of the teacher changes from a "deliverer" of information to a facilitator and mentor who guides students through their educational journey. They must be prepared to interact with technology in new ways. They must:

- ¥ navigate information in order to create knowledge using technology, media, and telecommunications
- ¥ be effective communicators through a variety of appropriate technologies/media
- ¥ use technology to foster the critical thinking and analyzing abilities of students
- ¥ provide technical support
- ¥ evaluate the uses and applications of technology
- ¥ create a learning environment with curriculums infused with technology and its applications
- ¥ engage in the planning process for future technologies and their applications.

Administrators

The school itself will change under the influences of technology and its applications. School administrators must be able to foster and support a new learning environment that is learner-centered. Those who are responsible for the administration of education must also become learners in the new technology environment in order to fulfill their partnership with teachers and students. Administrators will embrace more effective, increasingly efficient techniques that challenge traditional methodologies and philosophies. They will model technology use in their own daily life. Interaction with technology will require administrators to:

- ¥ plan for and implement technology and its applications
- ¥ provide leadership in the infusion of technology in the classroom

- create efficient and effective administrative processes using technology .

Communities

Communities will support vigorously the novel, energetic activities of the newly empowered students, teachers, and administrators. They will be afforded new opportunities for education as technology helps change the environment. A learning community will no longer have to be located wholly in a room or a building or a town or even a country. Learning communities will be able to span continents, and cultures as connectivity makes the world one large neighborhood. As community members become more diverse, communication patterns and learning behaviors will change drastically. New partnerships within the learning community will prepare students to meet vocational and societal demands. These new patterns of learning and living will take time to establish.

Summary

Technology will enable educators to respond to the needs of the citizens of the state of Mississippi by making it possible and practical to provide education outside the bounds of seven periods a day, five days a week. The "classroom" may be in the home, the library, the city hall, an auditorium, a shopping mall, or a school. The "teacher" may be in the room, in the city, in another state, or in another country. This will enable education to reach all individuals and will break down the barriers of time and space that get in the way of citizens becoming involved in the educational process. The vision of a well-informed, responsible, caring, educated citizenry that values innovation and is committed to consistent growth and improvement is achievable through the use of technology " *anywhere, any time, for everyone*."

2. PLANNING METHODOLOGY

This section outlines the overall study approach, data collection methods and instruments, and the overall planning process employed to produce the initial version of the *Mississippi Master Plan for Education Technology*.

2.1 Study Approach

The study approach is based on the belief that a successful education technology *Master Plan* must take into account existing systems and resources (public and private), incorporate promising emerging technologies, lay groundwork for future technologies, and address physical and financial constraints realistically. Further, the approach recognizes the importance of involvement of the stakeholders themselves in the crafting of a plan that will guide their own future initiatives in all matters pertaining to the use of technologies to enhance the educational opportunities for students in Mississippi.

The process of developing an education technology *Master Plan* provides an opportunity to examine educational goals and incorporate the best information available currently from educational research and curriculum reform efforts while remaining sensitive to the prime objective of giving teachers the tools to assist learning and increase achievement for students with diverse needs and learning styles. Technology should be a tool to improve education and not an end in itself. **Technology must be focused clearly on the fundamental goal of improving and enhancing the educational enterprise.** While a variety of exciting technologies employing voice, video, and data systems exist, care should be taken to focus on the integration of all these resources to form both a complete instructional delivery system and an educational information system.

Several characteristics of twenty-first Century schools impact the design and development of technology-supported education management. The pace and complexity of change place enormous demands on educators at all levels to access, interpret, and communicate information more rapidly than in the past. Moreover, within a shared decision-making environment, information needs to be available to teachers, principals, central office persons, and state agency personnel, in order for the optimum use of human and instructional resources to be realized. Education management systems must also assist decision makers in focusing the organization and in responding to increasing demands for accountability and communication by various stakeholders in the educational community. The education management system resulting from the *Master Plan* must be designed to address both the needed organizational strategies and structures as well as the support roles played by various individuals.

The framework provided by the technology support system design is only one component of the overall design for education management. The proposed technology applications must accommodate a future in which rapid and substantial changes in learning outcomes, teaching/learning environments, and organizational patterns are the norm. Such areas as student management, performance assessment, and instructional environments and resources are changing rapidly and need to be accommodated by a state-of-the-art education management system.

2.2 Data Collection Methods and Instruments

Recognizing that input from Mississippi educators at all levels is critical to a careful assessment of existing initiatives, the evaluation team used a variety of methods to collect educator assessments and feedback. Five evaluation methods were used during the first three phases of this study to collect the data required for production of the *Master Plan*:

- key stakeholder interviews
- document reviews

- survey of schools
- on-site visits to school districts
- focus group interviews

Each method is described in more detail below and a complete summary of the results obtained from these efforts may be found in the *Mississippi Master Plan for Education Technology Interim Report* document and appendices presented to the Council for Education Technology for approval on June 21, 1995.

2.2.1 Key Stakeholder Interviews

Key stakeholder interviews were conducted with Mississippi Department of Education staff and other key informants to enhance CELT's understanding of Mississippi's current education technology initiatives and identify any new or related programs that should be included in the study. During the study orientation meetings a list of key informants was developed jointly by the Mississippi Department of Education and CELT. A complete listing of the key stakeholders and the interview results may be found in Section 2 of the Interim Report.

2.2.2 Document Reviews

Document reviews included materials describing the current technology efforts, plans, and issues relating to future technology use. Documents were collected from the Mississippi Department of Education, the Governor's office, individual Institutions of Higher Learning, and other sources. Approximately fifty documents were reviewed by the study team. Information obtained from these documents is included in the discussion of study findings and recommendations in Section 3 of the Interim Report.

2.2.3 Surveys

A major data collection strategy was to survey all schools in Mississippi to determine the existing availability and use of technology. The survey contained 149 items organized into the following twelve sections:

- ¥ instructional uses of technology
- ¥ access to technology
- ¥ frequency of technology use by content area
- ¥ use of other technologies
- ¥ barriers to use of technology
- ¥ allocation of technology funds from all sources
- ¥ teacher training and professional development in technology
- ¥ teacher comfort
- ¥ technology planning
- ¥ technology infrastructure and capacity
- ¥ technology service needs
- ¥ benefits of technology use.

Results of the survey along with a complete analysis are available in Section 2 of the Interim Report and appendices of that report.

2.2.4 On- Site Visits and Focus Group Interviews

Focus group interviews were conducted in 11 school districts chosen in cooperation with the Project Advisory Committee and the Office of Educational Technology. These districts represent small, medium, and large districts and are geographically dispersed across the state with at least one district found in each of the five congressional districts. One day was spent for each on-site visit with a team of CELT staff and, at times, staff from the Office of Educational Technology. During these on-site visits, the team interviewed teachers, principals, district staff, community members and parents, and students. The team also visited selected schools and classrooms. Findings from site visits and focus group interviews are included in Section 3 of the Interim Report.

The focus group strategy was also employed during the process of composing the *Master Plan*. At this stage, eight focus groups were convened to provide opportunities for input from a broad cross-section of interested citizens on specific elements of the *Master Plan* including:

- ¥ telecommunications
- ¥ distance learning
- ¥ curriculum and instruction
- ¥ vendors
- ¥ staffing, training and certification
- ¥ evaluation/accountability
- ¥ professional development/preservice
- ¥ professional development/inservice.

The results of these focus groups were provided to the writing teams and are reflected in the various sections of this document.

2.3 *Statewide Master Plan Process*

As noted in the previous sections, the master technology planning process has involved several research methodologies and activities interacting with the Mississippi Department of Education leaders and the Council for Education Technology. Inherent in the CELT approach to the study of statewide education technology programs is the development of a consensus and commitment to a plan for implementing a comprehensive education technology system to enhance the delivery of instructional services. In Mississippi, the Project Advisory Committee and membership of the Council for Education Technology have assumed vital roles in the composition of the final plan as authors of individual sections with input from the CELT team assigned to the project. The *Master Plan* is thus truly a Mississippi technology plan with input from experienced Mississippi educators and a team of CELT planners.

As individual planning study activities have been completed, the key findings have been presented systematically to the MDE study managers and the Project Advisory Committee. Findings and identified needs have been employed to fashion recommendations and plan specific strategies for developing an education technology system to support education reform in Mississippi schools.

In order to complete development of the *Mississippi Master Plan for Education Technology*, the study team has concentrated efforts through a process which consistently focuses the content of the plan on learners. This process requires the direct input of Mississippi educators who will bear ultimate responsibility for implementing the plan. The steps in this process include:

- establishing an approved table of contents of the *Master Plan*
- conducting a statewide televised public broadcast on the *Master Plan*

- conducting statewide *Master Plan* focus groups on specific plan sections
- conducting public hearings for *Master Plan* input
- establishing *Master Plan* writing teams and assignments
- producing a *Master Plan* writing, editing, and revision schedule
- establishing final *Master Plan* production schedules
- preparing and delivering the *Master Plan* to the Council for Education Technology and the Mississippi Board of Education.

The CELT planning team applauds the educators of Mississippi for their overwhelming input during this process and their dedication to preparation of the *Mississippi Master Plan for Education Technology* which reflects realistically a statewide commitment to educational improvement.

3. NEEDS ANALYSIS AND KEY FINDINGS

The CELT consultant team assigned to the needs analysis phases of the Mississippi project conducted an extensive review of multiple information sources including:

- ¥ data obtained from an analysis of pertinent documents provided by the Mississippi Department of Education
- ¥ information obtained from key stakeholder interviews
- ¥ the statewide school technology survey
- ¥ on-site focus group interviews and site visits
- ¥ input from the Council for Education Technology and Project Advisory Committee .

A full review of those findings can be found in Section 3 of the draft Interim Report of June, 1995. The CELT team was able to depict several patterns from this cumulative review and has employed all the multiple data sources to formulate preliminary findings from the needs analysis. The following overall observations summarize the general response patterns from all sources:

- ¥ Mississippi educators and students in the public schools acknowledge the immediate need for several types of education technology resources. The technology devices most frequently used by students and teachers are VCRs, regular calculators, and desktop computers. Patterns of technology use by teachers and students are very similar.
- ¥ There is currently little systemic integration of technology into the curriculum in the majority of schools. Teacher and student use of technology is highest in the subjects of reading, mathematics, writing, and special education, although less than half of the schools reported use in these areas often or very often. Over seventy percent of those surveyed thought that integration of technology into the curriculum and curriculum development were top priority service needs.
- ¥ The lack of a statewide video, voice and data network creates problems with human networking, administrative computing , and permits scattered, incomplete communications. Less than 10% of the schools reported having classrooms wired for data, video production studios, student-generated video productions or centralized multimedia.
- ¥ There is a great deal of need for building retrofitting (rewiring of existing facilities) to deal with technologies at the school level as well as the need for extensive networking equipment.
- ¥ A notable concern among instructional and administrative personnel was the need for immediate upgrade of library and media services employing automated circulation programs and the establishment of Internet connections for student research access. Thirty-three percent of the schools reported having an automated media catalog, and less than ten percent of the schools have a networked automated circulation/catalog system, telecomputing to library/information sources, or other on-line services such as America Online or Prodigy.
- ¥ There are critical shortages of both training and equipment. Most of those interviewed were adamant in their belief that neither training nor equipment should be provided in isolation and that a statewide plan for training should be developed. Seventy-five percent indicated that the greatest service need was for training. The highest priority needs identified on the survey were software/hardware acquisition and training.
- ¥ One of the most positive findings of the study was the attitudes of educators, students, parents, and community members toward the prospect of increased levels of instructional technology in the classroom. However, less that one-third of the teachers are comfortable with camcorders, computers, and calculators and less than 10% of the teachers are comfortable with other technology devices.

- ¥ Parents, community members and business leaders shared the desire to become more involved in the planning process.
- ¥ Students at all levels were acutely aware of the need for advanced technological skills to survive and prosper in the 21st Century.

A final general finding was that the most prevalent use of technologies in the schools revolved around federally funded initiatives associated with Title I computer labs; pre-school programs; the more recently initiated Tech Prep program at the secondary level; and vocational education courses focusing on specific applications of technology-to-workplace training sponsored by Carl Perkins funding. Appendix C contains graphs of these findings.

3.1 Summary of Seven Major Categories

The following analysis provides a summary of the key findings of the study team in seven major categories. These seven categories were identified by the Council for Education Technology and the Project Advisory Committee as critical areas of emphasis within the state. Each of these categories is listed below along with highlights of the findings from all sources combined.

3.2 Curriculum Integration Strategies for Enhanced Learner Outcomes

> *Teachers need to become facilitators so kids can hit the ground running.*
>
> - Mississippi Educators

Key Findings

- ¥ Few schools are doing well at integration of technologies. Practices are not consistent across or within districts and schools.
- ¥ There is almost universal usage of Title 1 computer labs and writing and reading labs at the elementary level with few instances of integration of technologies past basic reading and math instruction.
- ¥ Core curriculum areas indicated low level technology usage (i.e., video and whole class instructional modes of overhead projection).
- ¥ Approximately one half of the districts employ ETV and Channel One as the primary instructional technology tool in the classroom.
- ¥ Most teachers have not been trained to integrate technology into the curriculum.
- ¥ Most schools lack sufficient technology resources to begin curriculum integration.
- ¥ There is limited use of adaptive and assistive devices in special education settings.

3.3 System Design, Equipment, Network, Facilities, Standards, and Procurement

> *How do you handle 32 kids in a class with one computer?*
>
> - Mississippi Educators

Key Findings

- There is currently no single statewide electronic highway for use by educators.
- Much of the current inventories of school technology resources are aging and not useful in an information technology network.
- Most schools are just now beginning to plan and/or install networks.
- Most districts lack personnel trained to develop standards for networks and technology installations.
- Schools need technology standards for building retrofit and construction as well as for networks and workstations.

3.4 Human Resources/Professional Development

> *It's useless to provide training if you don't have equipment.*
>
> - Mississippi Educators

Key Findings

- The MDE, districts, and schools lack personnel needed for technical support and training.
- Teacher training has been limited to the applications level.
- Without consistent access to technology resources, teachers cannot practice new technology skills.
- Many teachers feel that fear of the computer and other technologies in the classroom is rapidly overcome by training and equipment availability.
- Instructional personnel prefer training models that stress local availability and are continuous over an extended period of time.
- Peer-to-peer training is preferred when available by administrative, media, and instructional staff.

3.5 Equity and Access to Technology

> *What's offered for one should be offered for all.*
>
> - Mississippi Educator and Parent

Key Findings

- Access to technology varies widely from district-to-district and school-to-school.

- ¥ Equity of access for gender, physical needs, and rural and low-income districts has not been addressed.
- ¥ Long-distance telephone charges limit access to existing telecommunications resources.
- ¥ Wide discrepancy in the tax base for districts limits access to technologies and equipment.

3.6 Administrative Technology Use

> *We need to network the districts together.*
>
> - Mississippi Educator

Key Findings

- ¥ Many administrators have little training in administrative technology applications and are not modeling the effective use of information expected for classrooms. Approximately 1/2 of administrators have had basic SEMI Computer Applications module.
- ¥ Policies for administrative and instructional technology are lacking.
- ¥ Most schools are not networked inside or outside the district.

3.7 Funding

> *We want Mississippi kids to get everything others do.*
>
> - Mississippi Parent

Key Findings

- ¥ There are no consistent procedures or sources to support education technology.
- ¥ Seeking funding from any source is difficult, especially without a state plan and a district plan.
- ¥ Few districts are able to direct sufficient local funds to make a difference.

3.8 Local Technology Planning

> *We lack the vision of technology. [We need to] Organize coalitions with parents, businesses and schools.*
>
> - Mississippi Parent/Business Representative/ Community Representative

Key Findings

- ¥ Many districts have no formal technology plans, and existing district plans vary widely in content and degree of detail.
- ¥ Existing district technology plans show little involvement of stakeholders.

4. MISSISSIPPI MASTER PLAN FOR EDUCATION TECHNOLOGY

Effective activities most frequently are guided by a structure that provides clear direction to all personnel involved. When vagueness or ambiguity creeps in, the possibility for failure increases immensely. The teams of people who have worked diligently to craft this *Mississippi Master Plan for Education Technology* have striven to detail a strong framework in which all school districts in Mississippi, regardless of demographic composition, can function well and prosper, enhanced by instructional technologies. The *Master Plan* is intended to serve as a tool of leadership -- one which will encourage all affected entities to unite their efforts and pool their talents so the instruction that is provided to all Mississippi citizens will function at an optimum level.

This section of the *Master Plan* provides information concerning:

- ¥ curriculum improvement and technology integration strategies/changing nature of curriculum
- ¥ education technology system design
- ¥ education accountability and reporting system design
- ¥ learning environments and facility planning
- ¥ distance learning
- ¥ professional development plans (for preservice and in-service teachers, as well as administrators)
- ¥ education technology policy and procedures
- ¥ technology standards and procurement strategies
- ¥ roles and responsibilities of agencies and individuals, staffing positions, and organizational structures of related agencies
- ¥ program monitoring and evaluation plan for the overall technology planning process

In keeping with the intent of Senate Bill 3350 (specifically, *Section*s 18-41, commonly referred to as the Technology Enhancement Act), this section addresses the full instructional gamut. Strategies are given to meet existing needs and to deploy an energetic plan for cultivating a robust future with technology-enhanced learning. Plenty of room is left, though, for individual creativity and sensible option exploration by school districts. Close coordination among school districts, higher education entities, state agencies, and other support organizations will be essential for clear success to be achieved.

4.1 Curriculum Improvement and Technology Integration Strategies/Changing Nature of Curriculum

Leadership within the state envisions Mississippi classrooms where using technology is as natural to students and teachers as using textbooks and chalk. Technology should be integrated seamlessly throughout the curriculum. Technology is neither an end in itself nor an add-on. It is a tool for improving and, ultimately, transforming teaching and learning environments to provide exciting and enriching 21st Century learning experiences.

As schools move into the 21st Century, Mississippi educators must challenge all students to gain the appropriate knowledge, skills, and work ethics necessary to function in an information-rich society and to adjust to the ever-changing world of technology.

Communities throughout the United States are recognizing the need to rethink curriculum offerings and the delivery of instruction. What has been appropriate for the past 100 years no longer provides lucrative employment for today's students. Defined as the "Communication Age", the approaching century demands that students develop new roles in learning, living, and working. In order to prepare students to become responsible citizens, workers, learners, community members, and family members, schools need to go beyond the traditional rote method of teaching reading, writing, and arithmetic skills. In addition to teaching basic skills, schools are now challenged to help all learners, teachers, and students alike to:

- ¥ think critically and to analyze information using technology
- ¥ communicate effectively through a variety of appropriate technological media
- ¥ master skills required to interact with technology and to manage constant change
- ¥ become discriminating users of appropriate sources of information
- ¥ become managers of and active participants in their own learning.

4.1.1 Existing Conditions

> *We have to challenge the notion that our math curriculum can continue to consist of eight years of 15th Century arithmetic, followed by one year of 17th Century algebra, followed by one year of 3rd Century B.C. geometry.*
>
> - Lamar Alexander, Former U.S. Secretary of Education

Just as technology is reshaping other institutions, it has the potential to reshape education, ending the disjunction between school and society. Technology offers new ways of learning, of teaching, and of operating the school environment. It provides new ways for everyone involved to be openly accountable to parents, to communities, to administration, and to the student.

The needs analysis conducted by the CELT team found that:

- ¥ Even though Mississippi school districts have academic curriculum frameworks/structures in place, in most cases technology has not been integrated into these curriculum-guiding documents.
- ¥ There is little systematic integration of technology into curriculum although 70% of those surveyed viewed this as a top priority need.
- ¥ Districts do not have sufficient technology resources to begin the process of curriculum and technology integration at all instructional levels and across all disciplines.
- ¥ Teachers have not been trained sufficiently in the integration of technology into the curriculum.
- ¥ Technology use is primarily limited to Title I computer labs and reading/writing labs at the elementary level with few instances of the integration of technologies past the basic reading and math instruction.
- ¥ There is limited use of adaptive and assistive technology devices in special education settings.

4.1.2 Mississippi's Changing Instructional Landscape

> *Kids retain five percent of what they hear and ten percent of what they read, but eighty percent of what they do and ninety percent of what they teach.*
>
> - Robert Ballard, Woods Hole Oceanographic Institution

What began as a potential means of raising student achievement has evolved into an intense effort to reconceptualize the learning process in light of 21st Century needs. This effort has been accomplished by an increasing understanding of the powerful roles that technology-based tools may play in facilitating this process. There are currently several efforts underway to integrate technology into the learning environment in Mississippi.

In Mississippi's new math curriculum structure, based on NCTM standards, technology integration is stressed. This is continued in the development of future state curriculum frameworks. Arts, English/reading, language arts, and business/technical curriculums will be developed by April, 1996. These new curriculums will emphasize skills that are valued in today's workforce, including critical thinking, teamwork, compromise, and communications.

Through Mississippi's new assessment system, students are required to use graphing calculators in the algebra section of the test. There has been extensive teacher training done in this area by the Mississippi Department of Education Office of Academic Education via the Community College Network.

The Mississippi Department of Education Office of Special Education (OSE) has implemented an aggressive educational and evaluative campaign in the area of assistive technology. In the fall of 1995, OSE will open an evaluation center for assistive technology. This will be a state-of-the-art center with assistive technology devices addressing such needs as positioning, wheelchairs, computer applications (over $10,000 in computer software), and speech augmentation. This center will be staffed with an occupational therapist, physical therapist, and speech pathologist. The responsibilities include evaluating children and making recommendations regarding the most suitable assistive technology. Center staff will also be responsible for teaching educators and families the appropriate use of these techniques and resources.

To assist in training teachers, OSE is participating in a dissemination grant from the University of New Mexico for the next three years. This project provides thirty-two semester course hours in assistive technology delivered by distance learning to ten sites in Mississippi. Also included in the coursework resources are CD-ROMs, videotapes, e-mail, and use of the Internet to talk with participants in the eight other states. The Office of Educational Technology is working with the staff of OSE to develop this teacher training.

The Mississippi Department of Education, Office of Educational Technology, is currently developing a training model to help teachers to integrate technology into the curriculum. Teachers become guides or mentors who help students navigate through the information made available by technology and interactive communication. Both the teacher and technology become tools that students draw upon to advance their own learning.

Writing-to-Read, a program of learning developed by IBM to teach kindergarten and first graders to read, is currently in place in 162 schools across Mississippi. Through this program, kindergarten and first-grade students are introduced to keyboarding skills, begin developing writing and reading skills, and strengthen listening and comprehension skills. Other educational activities (both in class and at home) are coordinated with the classroom.

Mississippi Fibernet 2000 is a public/private partnership providing distance education for students and enrichment, and inservice programs for teachers, via an interactive compressed video and data network.

Participating students and teachers at remote locations can see and hear each other as well as communicate via the wide-area computer network at all times. This network was the first of its kind in the nation. It is designed to expand learning opportunities in small, isolated, and rural school districts. Without leaving their schools, students can attend classes in creative writing, foreign languages, communications, computer applications, and mathematics at fifteen sites in the state.

Tech Prep provides an educational path that leads to tomorrow. It integrates college preparatory coursework with vocational and technical applications. This planned sequence of courses begins in middle school and is articulated to the community college degree program, resulting in an associate of applied science degree. Through this unique program, Mississippi students can be a part of a workforce that will ensure the state's ability to thrive in the future. This program piloted fifteen sites in 1993-1994, established fifty-one sites in 1994-1995, and funded an additional twenty-five sites in 1995-1996. See Appendix J for additional information.

4.1.3 The New "Basic Skills" for the 21st Century

Literacy in the 21st Century no longer means merely the ability to read printed material and write with a pencil. For the 21st Century a variety of wide-ranging skills are needed that include the ability to navigate through the maze of available information, to problem solve, and to think critically utilizing a diverse array of technological tools.

Mississippi students must become proficient processors of information, developing the ability to:

- ¥ access information from diverse sources
- ¥ analyze numerical, textual, and visual data
- ¥ communicate their findings to a variety of audiences .

Students must accept the responsibility and be armed with the skills to become lifelong learners for individual success as well as the economic stability and development of communities and districts within the state. This requires that teachers interweave content, process, and technology skills into a carefully planned quilt of instruction.

Technology integration is a catalyst for reforming education and creating the new learning environments required to meet the challenges facing Mississippi's educational systems in the 21st Century. The basis for using technology in Mississippi's schools should be to promote various types of learning including:

- ¥ inquiry-based
- ¥ interactive
- ¥ student-directed
- ¥ lifelong
- ¥ meaningful/real-world.

The use of a wide array of technological tools and applications in the classroom enables educators to create a learning environment that provides the means by which students:

- ¥ become responsible
- ¥ focus on identified learner outcomes
- ¥ engage in cooperative work efforts
- ¥ apply learning to real-life situations and experiences
- ¥ create their own knowledge structures through critical thinking, problem solving and important decision making

- ¥ demonstrate progress and mastery of educational goals.

4.1.4 Impact of Education Technologies on Curriculum and Instruction

Examples of the positive impacts that innovative teaching and learning methods can have on students exist already in parts of Mississippi. These models need to be celebrated and replicated throughout the state. Leadership within the state seeks to create a technologically-enriched educational system statewide where students of all ages will exhibit a love for learning that will carry them prosperously into adulthood. They will be risk takers in their pursuit of knowledge, willing to venture into new arenas and apply past experiences to new adventures. Mississippi students will become thinkers and creators of new knowledge to coincide with and complement their ever-changing world.

Early Elementary Students

More specifically, the readiness level of the second-grade student will be exhibited by his/her emerging sense of self and developing independence. Able to work independently and participate in small and large group activities, this age child will immerse him/herself in rich exploratory environments. Fundamental language arts, mathematics, and socialization skills are the focus of attention in the early elementary years. This child is a "beginner" in all areas, seeking to perfect a diverse array of skills while identifying unique preferences and areas of strength.

The infusion of education technology into the early elementary classroom has traditionally been used as a way to reinforce the use of traditional manipulatives and hands-on resources via a medium that is well within the learner's worldly experiences. Appropriate technology for primary schools enables the child to engage in basic skill development in mathematics, reading, writing , and other content areas through a wide assortment of technology tools or instructional software. Computer-assisted instruction programs provide a fun way for children to receive additional practice in basic skills development. Primary learners are able to extend their language arts ability through interactive engagement with CD-ROM stories, capture their imagination by writing a story using a word processing program, or represent their creativity by drawing or painting images graphically with a computer. Children who demonstrate ease of use and an ability to utilize various forms of technology should be provided further opportunities to extend their proficiencies with technology simulations, real world and virtual field trips . Additionally, providing young learners with access to education technology shows them that computers and other mediums are an integral part of lifelong learning and not an isolated element of their formal schooling.

Upper Elementary Students

Armed with the confidence of a full complement of basic language arts, mathematics, and socialization skills, the third through fifth-grade student is interested in a wealth of fleeting topics. Today it might be motorcycles and the planets, tomorrow whales and hot air balloons. *Carpe diem*, "Seize the Day", becomes the battle cry of the upper elementary classroom teacher. Provided with a variety of resources, this learner is prepared to engage in both semi-concrete and semi-abstract activities. The outcomes of his/her investigation are always enlightening. Fascinated by the most unusual facts, this student is an astute observer and processor of information.

A technologically-enriched environment nurtures intermediate-aged learners to process information independently or cooperatively within small group settings. Students are able to work collaboratively toward a common goal by communicating with peers, teachers and parents through a variety of modes. In addition, students are able to develop collectively class project s using word processing, database, spreadsheets, desktop publishing, telecommunications, or multimedia presentations, thereby representing the outcomes of their learning. Thus, intermediate learners are able to expand the use of education technology initially introduced in the primary setting by utilizing technology in productive, creative formats.

Middle School Students

The middle school child will satisfy his/her need to socialize through increasingly sophisticated collaborative efforts addressing authentic and pertinent issues. While growing more aware of the world around him/her, the middle school child juggles physical changes, growing responsibilities and expectations, and emerging higher-order thinking skills. Successful experiences among peers, during the middle school years, mold both the self-confidence and self-esteem of this preadolescent.

Cooperative grouping and project-based learning activities provide the appropriate learning conditions for middle school students to explore their own defined educational pursuits. The incorporation of education technology further enables exploration in group (or individual) projects and is limited only by one's imagination (and the limitations of technology resources in the classroom). Working in a learning environment where computer technology is available further reinforces core concepts and principles through writing practice and creative expression, information access, desktop publishing activities, multimedia development and presentations , and the overall improvement and mastery of computer competencies. The availability of computer technologies for middle school students will further expand their capacities and skills through an interdisciplinary approach to effective learning.

Junior High/High School Students

Students graduating from Mississippi high schools will face the next stage of their lives with optimism, enthusiasm, excitement, and a sense of preparedness. They will be confident in their knowledge of the world around them and their ability to learn new skills which inevitably await them. Whether proceeding on to higher education or entering the world of work, students from Mississippi will exhibit a sense of community and responsible societal membership which will serve them well in all environments.

Secondary schools need to accommodate the rapid changes across the world by providing students with educational experiences that have real-life applications. Many of these real-life experiences already include various aspects of using technology. Thus, it is important that the secondary education learning environment supports and nurtures collaborative efforts, provides access to ideas and resources across disciplines as well as across the globe, and encourages interdisciplinary instruction across the curriculum.

Some examples of real-life technology-oriented capabilities that should be available to all Mississippi high school students include:

- ¥ accessing information from the school's media center by using an electronic card catalog
- ¥ searching information beyond the school walls through "on-line" telecommunications
- ¥ researching information on an encyclopedia stored on a CD-ROM compact disk
- ¥ preparing for a math exam by using a graphing calculator
- ¥ drafting 3-D designs using the latest autocad, or computer-assisted design program
- ¥ writing and publishing a newspaper or newsletter by using word processing, graphics, scanning, and desktop publishing applications
- ¥ studying for an exam or preparing for a standardized test by reviewing computer-assisted instruction programs in the form of tutorials, drill and practice, simulations, or problem-solving activities
- ¥ creating a prototype of a community bank in which a school utilizes sophisticated spreadsheet applications, complete with interest-bearing savings accounts and possible loan distribution for those important events like proms and homecoming dances
- ¥ developing multimedia presentations that include use of a still video camera, CD-ROM or laserdisc player, and a VCR.

The above list represents only a small sample of technological possibilities for schools. Examples of instructional disciplines currently incorporating technology include:

- *vocational education* -- students gain experience with up-to-date software currently used in business, such as state-of-the-art office automation technologies
- *biology and chemistry* -- a variety of probes or measurement devices interface with a computer and gather data automatically
- *music and band* -- computer systems are equipped with MIDI interfaces so students can experience meter, rhythm, pitch, and volume to explore music composition possibilities
- *computer science* -- students interested in formal programming instruction and applications can create programs that may provide a foundation for advanced college coursework in mathematics, engineering, or computer science.

In addition to the specific examples cited above, many computer applications are not discipline-specific. For example, innovative student creations in the form of a hypermedia or multimedia presentation can easily be applied for instructional purposes or developed for project-based learning. Subject areas such as literature, social studies, math, foreign language, physical education and health can all benefit from the computer applications readily available for student use.

4.1.5 Integration Principles

> *Integrating technology into [today's classrooms] makes about as much sense as integrating the internal combustion engine into the horse.*
>
> - Lewis Perelman, Discovery Institute

This quote is true if Mississippians think of the classroom today in the traditional educational sense - thirty desks in rows and the teacher lecturing at the front. Instead, leadership suggests that technology should promote an environment where learning can take place any time, from any place, and be available for everyone. In this environment technology is a natural and integrated part of learning. Students will acquire basic technological skills including word processing, desktop publishing, databases, spreadsheets, computer graphics, electronic communication, information management, interactive media, video, calculators, and other specialized technologies while mastering curricular knowledge and process skills (e.g., writing process, research process, scientific process, mathematical modeling, and higher-order thinking).

Curriculum and technology integration can best be described as the alignment of curricular objectives with technology competency milestones such that students and teachers "learn about" technology by "teaching and learning with technology". Technology competency milestones, such as students in grade five can produce a document with word processing, provide the direction for infusing technology tools and resources into appropriate curriculum areas. This introduction of technology tools into daily learning environments also allows teachers and students to simultaneously focus on the process skills mentioned above. Thus, instructional activities across the disciplines over time will reflect a marriage of content, technology, and process skills.

Curriculum integration is an evolution, not an event. It is cyclical in nature. The more students and teachers "learn about" the potential of specific applications and technology resources, the more they will be able to "teach and learn with" these powerful tools. Likewise, as the number of instructional initiatives "teaching and learning with" technology increases, the sophistication level of the users increases and the need to know more "about " complex features and advanced applications escalates.

Over time, the successful alignment of curriculum and technology brings about observable changes in teaching and learning environments. Categorized by *Technology and Learning* authors, Odvard Egil

Dyrli and Daniel E. Kinnaman, the impact of technology integration on the curricula will occur in three progressive levels:

- ¥ **enhancing and enriching** the existing curricula using technology within the confines of existing school structures and schedules;
- ¥ **extending** the existing curricula with technology by providing opportunities beyond the limitations of school structures and schedules without serious disruption; and,
- ¥ **transforming** the classroom curricula through technology in ways that may require new paradigms, changes in organizational structures, and innovative schedules of schooling .

For this progression toward systemic curriculum and technology integration to occur, a well-orchestrated attack on three key conditions must be addressed and nurtured at the district, school, and individual/personal levels:

- ¥ develop a clear technology vision for all Mississippi leadership and educators
- ¥ align key variables
- ¥ manage technology resources.

Develop a Technology Vision

Stakeholder participation, one of the critical success factors in the technology planning process, requires that the stakeholders have a clear and thorough understanding of the state's technology vision. This vision must reflect the state 's desire to use technology as a powerful vehicle to achieve the 21st Century reform efforts targeted as state and district priorities. State, district, and school-based leadership, teachers, and parents of school-age children must be able to articulate to the community at large the need for education reform and the investment of time and mon etary resources, as well as patience with the process of change in schools across the state.

Development, articulation, and building support for state, district, and school technology visions must become and remain a high priority for leadership within the state.

Align Key Variables

A formidable task before leadership, curriculum and technology experts, and professional development providers is the alignment of the following key variables:

- ¥ curriculum objectives (content knowledge and process skills)
- ¥ student developmental needs
- ¥ student and teacher technology competencies
- ¥ district reform effort priorities
- ¥ school improvement plans
- ¥ professional development offerings .

The orchestration of aligning these variables will require guidance at the state and district levels that includes participation from the Mississippi Department of Education, superintendents, principals, teachers, and specialists, while allowing for individualization at the district, school, and classroom levels.

Technology integration principles that guide the incorporation of technology into the curriculum result from a recognition of the evolutionary process experienced as teachers gain confidence in the use of word processors, image processors, databases, spreadsheets, graphic tools, idea processors and communication tools (i.e. the Internet and on-line services). These principles represent structures required for initiating and sustaining progressive curriculum integration over time.

The following are guiding principles of curriculum integration for Mississippi educators:

- ¥ Technology will be integrated into all curricular areas and instructional settings (K-12, vocational and adult education, exceptional education) and preservice programs.
- ¥ The attainment of major curriculum reform will require the successful infusion and integration of technology into teaching and learning environments.
- ¥ Curriculum reforms will be aligned with technology integration standards embraced by national subject area leadership organizations like NSTA, NCTM, NCTE, ISTE, etc., and their state-level affiliates.
- ¥ Technology integration will promote critical thinking, cooperative learning, analysis and synthesis of information, interdisciplinary learning, and improved communication skills.
- ¥ Successful integration of technology requires a change in the traditional roles of teachers and students. Teachers become facilitators and students become active participants.
- ¥ Technology will provide students with a tool for self-directed learning and discovery.
- ¥ Technology will improve instructional delivery to help meet needs for educational equity.
- ¥ Technology integration will bring a global perspective to schools that have traditionally been very rural and isolated.
- ¥ Successful curriculum and technology integration implementation requires sustained support and cooperation from all levels of administration.
- ¥ The integration of technology into the curriculum **MUST** begin with adequate, appropriate, directed, and effective training. It must be supported by continuous, ongoing professional development.
- ¥ Adequate funding and support must be in place for initial implementation as well as ongoing system maintenance and upgrades.
- ¥ Adequate and sufficient funding must be provided for instructional resources related to the implementation and interaction of technology.
- ¥ Student skill development in the use of technology tools will be integrated into the curriculum. Skills will be blended into existing courses and NOT taught as a separate subject. They include the use of productivity tools, telecommunication tools, multimedia, authoring and publishing tools, on-line networks, and electronic information resource tools.
- ¥ As technology is integrated into the curriculum, the teacher, parents, administrators, and school boards must encourage and welcome changes in student assessment methods.
- ¥ The development and installation of affordable connectivity to a statewide network and other on-line network resources will assist all schools in all districts with their curriculum integration initiatives.

4.1.6 Implementation Strategies

> *In the Information Age, the human beings that industry needs are those who can do their own thinking, get actively involved, work in teams, and be innovative, not merely industrious. The problem is, the factory model school, which doesn't encourage those qualities, is still with us and needs to be replaced with a new kind of schooling that does.*
>
> - Bill Blakemore, ABC News

Many districts aim to make technology an integral part of the curriculum, seeing such integration as a means to enhance academic achievement and promote learning among students. Technology is seen

as a positive enabling factor in both the delivery and management of instruction, allowing schools to more appropriately address individual learning needs and styles. The following implementation plan should serve as a guideline for the state and districts alike as they take the leadership role in supporting the curriculum integration needs of Mississippi schools.

- ¥ Office of Educational Technology will identify exemplary models of technology integration and disseminate this information to help districts and schools develop their own curriculum integration plans.
- ¥ Offices of Education Technology and Management Information Systems will develop and make available, both in print and electronic formats, a statewide database of curriculum integration resources including human and material resources.
- ¥ Office of Educational Technology will work with other offices in the MDE to establish curriculum integration guidelines linking appropriate technologies to specific instructional activities.
- ¥ Office of Educational Technology will work with other offices in the MDE to promote statewide curriculum integration projects across disciplines through model instructional settings.
- ¥ Office of Educational Technology will work with other offices in the MDE to embed core technology competencies throughout the curriculum.
- ¥ Office of Educational Technology will provide training opportunities in curriculum integration strategies for educators at all instructional levels, elementary, middle, and high school. Likewise, models will be identified that demonstrate the changing roles of teachers and students. Professional development training opportunities that focus on enabling teachers, administrators, parents, and school board members to be comfortable in these ever-changing learning environments will also be offered.
- ¥ Mississippi Department of Education will join forces with other state and federal agencies on initiatives such as Goals 2000 and other programs to expand, evaluate, and build upon their knowledge of curriculum reforms in education technology as well as professional development alternatives for the current teacher force.
- ¥ Local school districts will seek to develop and promote new school/business partnerships that foster mutually beneficial relationships.
- ¥ Local school districts will schedule sufficient planning time for teachers to learn how to use the technology.
- ¥ Schools will increase flexibility by allowing demand, need, and opportunity to dictate schedules, instead of schedules dictating learning opportunities.
- ¥ Schools will investigate "buddy system" models where technology-proficient students partner with younger students to assist with attaining fundamental technology competencies, freeing the teacher to concentrate on integrating these powerful technology tools into instructional tasks.
- ¥ Schools will encourage interdisciplinary courses and projects designed around themes to create an authentic, seamless, and technology-oriented curriculum.

4.2 Education Technology System Design

> *Businesses have been building electronic highways while education has been creating an electronic dirt road. And sometimes on a dirt road it is easier to just get out and walk.*
>
> - Fred D'Ignazio (1993)

The educational technology system design involves wide-area networking, local-area networking, satellite interconnectivity, ITFS, broadcast, interactive video, computer workstations, CD-ROM, videotape, conventional telephone service, master television systems, and other classroom technology. It is important to realize that education technology encompasses any technology that enhances the educational process. In essence local learning technologies, multimedia computers, local-area networks, CD-ROM drives, video tape recorders, and videodiscs must be integrated with distance-learning technologies, satellite, ITFS, interactive video (CCN, Fibernet, etc.), television broadcast, and Internet access to create an effective high technology learning environment.

The education technology system design represents a key part of *the Mississippi Master Plan for Education Technology*. Recognizing this, the Council for Education Technology appointed a special Telecommunications Committee to study the following strategic areas: common needs, technical specifications and network capacities, public awareness and dissemination of information , and the development of state level capacity for future telecommunications planning and coordination. The Telecommunications Committee and its subcommittees (Common Needs, Technical Specifications, Public Information, and Concept) presented a detailed report of their study to the Council its September meeting (This report is presented in its entirety as an addendum to the *Master Plan*).

Because of the broad scope of the education technology system design some components come from several important studies conducted by the educational entities. A network study prepared by Network Evolutions, Incorporated, for the MIS Department at MDE; the *Evan's Report,* a technology plan for the community and junior college system and the library system in the state; and the IHL needs analysis documents on networking and distance learning served as resources for the development of this section.

The Telecommunications Committee developed the following vision, mission , and needs statements to guide the network design in concert with legislative directives and intent.

Vision

The educational partners of public schools, community and junior colleges , universities, educational television, libraries, and the state's Information and Technology Services are committed to enhancing the quality of life for Mississippians through lifelong learning by providing and integrating technology-based communications and information systems to support all aspects of education. The partners seek to establish a framework for the interconnectivity of Mississippi networks and other networks to provide access to telecommunications services. The partners pledge their resources to create educational and economic opportunities for Mississippians today and tomorrow.

Mission

The partners are committed to creating, maintaining, and sustaining a technology infrastructure that enables equitable and universal access to information and services. Further, the technology should enhance Mississippi's efforts in lifelong learning, research, economic development, and other quality-of-life components through our collaborative efforts and strategic use of public/private partnerships.

Needs

The educational partners acknowledge the ever-increasing pace of a changing, global society. Therefore, we identify the following needs which must (or should) be addressed by improving communication and technology services:

- ¥ Improve educational offerings for citizens of the state of Mississippi by designing an integrated, technology-based communications and information system to support all aspects of education. Citizens to be served include, but are not limited to educational entities, students, parents, communities, business/industry, and governmental agencies.
- ¥ Enhance efficiency in the delivery of education and information services .
- ¥ Ensure that the services are offered in an equitable manner.
- ¥ Ensure that the services are affordable for all end-users.
- ¥ Encourage information sharing and common needs identification among various entities.
- ¥ Reduce duplication of services where missions converge.
- ¥ Develop a flexible system that can easily be modified, upgraded, and expanded to accommodate connectivity, future growth, and development.
- ¥ Improve the quality and quantity of technology tools.
- ¥ Ensure that a variety of technological tools are available to enhance the learning process.

4.2.1 Education Technology System Architecture

Mississippi's education technology system architecture should be needs driven and address the design and implementation of various technologies in the classroom, and school, distance-learning technologies, and local and wide-area networking.

Classroom technologies, or user interfaces (e.g., multimedia computers, television receivers, projection systems, telephones, fax machines) and other technologies that link the learner to information should all be considered when designing the high technology classroom.

The education technology system architecture should:

- ¥ maximize learning efficiency and economy by matching the technology to the need
- ¥ create the proper learning environment by addressing ergonomics, the elimination of distractions, and aesthetics
- ¥ create the most user-friendly interface possible
- ¥ minimize the cost of interconnectivity by exploring all options
- ¥ enable universal access--a concept that states that the network architecture and costs associated with the network should be affordable and equitable
- ¥ be location insensitive--areas of the state must not be penalized for their rurality
- ¥ support vendor independence--the network design should be open for competition among providers. Components of the networks should be vendor independent as well, in platform and software
- ¥ create a system of maintenance and support and a funding mechanism for same
- ¥ be based on interoperability--the network design should support multiple platforms and technologies. It should be transparent to the user and neutral in terms of ownership

- ¥ be application driven --the network should develop and adapt around the needs of the users, those who provide the "programming" and those who create the applications
- ¥ consider financial resources for system sustainability
- ¥ adhere to telecommunication standards recommended by the Technical Specifications Subcommittee.

In summary, the network must serve the end-user in terms of the following:

- ¥ *cost*--reduce cost where practical without limiting connectivity
- ¥ ease of *migration*--allow for a smooth implementation of the network services
- ¥ ease of *management*--allow for centralized management and scheduling of the network
- ¥ *scalability*--enable the network to grow
- ¥ *expandability*--enable a site to expand its capabilities
- ¥ *proven technology*--use currently available and proven technology .

Distance learning is an important aspect of the education technology system design. Included in the definition of distance learning is the process of providing instruction to students that are unable to receive instruction at their location. New technologies and delivery systems can provide various levels of interactive distance learning anywhere in the nation or the world.

Essentially, the education technology system architecture should incorporate new technologies that enhance learning within the classroom environment, such as:

- ¥ multimedia computer workstations (information resource interface)
- ¥ classroom computer networking (local-area networks)
- ¥ wide-area networks
- ¥ distance learning technologies
- ¥ satellite distribution
- ¥ ITFS-Instructional Television Fixed Service
- ¥ broadcast television
- ¥ interactive video.

4.2.2 General Design Principles

The following general principles must govern the education technology system design:

Adequate and Economical Service

Each of the educational entities is to have access to the connectivity capacity required to provide an economical education technology network with seamless interoperability without duplication of resources.

Equipment Standards and Guidelines

Equipment standards and operational guidelines are to be developed and integrated throughout the network. Standards will be updated at least annually, or as needed, with input gathered from each agency as to needs, capacities, and proposed revisions.

Standard Protocols

The key to interoperability will be the standardization of data and video communications protocols and a high degree of coordination and cooperation among the agencies. TCP/IP is currently the international standard for data communications over the Internet which provides for international interoperability. Therefore all agencies should agree to conform to this protocol standard for data communications and future video standards established by ITS and the Council for Education Technology.

4.2.3 Application Principles

A broad array of software packages must be available to every student, instructor, administrator, and citizen that will meet their common application needs. Provisions must be made to purchase statewide software licenses and to keep application software up-to-date. The selected hardware must have the flexibility to meet the broad range of educational applications that exist today and in the future across the entire education spectrum.

4.2.3.1 Technology Utilization

Technology utilization is dependent upon informed choices which define patterns of software, hardware, and peripheral devices installed to augment instruction and support classroom, school, and district level data management and reporting functions. The following patterns are offered as guides to assist local districts in the acquisition of hardware and software systems.

Classroom Clusters

Technology within the typical K-12 classroom should include a cluster of computers at a ratio of one computer to every five children. Each computer is to be connected to a "server-based" local area network system within the school that is designed around state-of-the-art networking hardware and software utilizing the star network topology and 10BaseT technologies. In selected classrooms additional computer peripherals will be required to meet specific subject area requirements such as data collection probes for real time monitoring of science experiments, etc. All classrooms should be equipped with a multimedia-based computer to serve as a teacher workstation and it should be connected to a display system to support easy viewing of displayed information by all students. This workstation must be appropriately designed and equipped specifically to support the daily delivery of instruction. All network wiring should be Category 5 and installed to 100 Mbps standards.

Workstations do not have to be the traditional desktop variety. These "desktop computers" could be laptops. The availability, affordability, and practicality of having a tool that weighs less than 10 pounds and that can be easily checked out for overnight use is beneficial. Districts should consider seriously the purchase of laptops to be placed in the media center for student/staff checkout and use.

The classroom clusters configuration is recommended for schools.

Computer Laboratories

In those schools where clusters of computers within classrooms are not deemed appropriate to support the instructional environment, the computer "laboratory approach" may be utilized although this is **not recommended** as the sole implementation configuration. Under this arrangement a group of 20 to 25 computer workstations are to be located in a classroom that is designed to provide an appropriate work environment for a large group of students working on such things as science and writing projects. Under the laboratory arrangement a ratio of one student per computer should be maintained at all times. A typical computer lab containing 25 computers should contain no less than 1200 square feet of space, adequate sound conditioning, carpet, ergonomically-designed furniture to accommodate an array of different ages and sizes of children, appropriate and adequate lighting, and sufficient air conditioning to

handle the additional heat load generated by the workstations. Computer labs are to serve as general purpose facilities designed to meet a broad range of educational needs within the school and community. In selected situations, where conditions require, additional equipment may be added to the laboratory to meet the specific needs of specialized user groups. Each computer lab is to meet the same design and performance requirements as previously outlined for classroom computer clusters. See Appendix H for three typical laboratory arrangements. Also see Appendix D for workstation and local-area network specifications.

Local-Area Networks - Building Networks

Each existing building and all new buildings within a school district should be wired to support computer connections in all classrooms to the local-area network. Structured wiring systems designed to accommodate current and future needs should be implemented in all buildings to carry both data and video signals. Wiring conduits and raceways should be installed throughout all school buildings to provide access for the installation of new wiring systems as network demands expand. Building network configurations should be designed as star topologies using 10BaseT Ethernet technologies. All wiring should extend from classrooms and offices to network hubs installed in designated wiring closets. Network maps should be developed and all cables should be logically labeled and documented in the appropriate network drawing. The network should be designed as a "server-based" network with all software installed on the file server and not on individual workstations. Hubs located in different wiring closets should be connected with fiber-optic cables which contain additional pairs of fibers designated for applications in the future. All network wiring should be Category 5 and installed to 100 Mbps standards. See Appendix D for local-area network specifications.

Extended Local-Area Networks - Campus Networks

On school campuses where more than one building is located in close proximity (on the same campus) the local-area network should be extended to provide access across the entire campus. This should be accomplished by networking all computers throughout all buildings and establishing centralized wiring closets in each building to accommodate network wiring hubs. Buildings should be interconnected with fiber-optic cable to keep within Ethernet transmission distance standards and to prevent network and workstation damage from lightning strikes. All network wiring should be Category 5 and installed to 100 Mbps standards. See Appendix D for local-area network specifications.

Wide-Area Networks - District Networks

In school districts where buildings are located on different campuses attention must be given to interconnecting the local-area networks found on each campus into a wide-area network to provide systemwide communications capability. The interconnections between different campuses can be accomplished in a variety of ways. Each school district should investigate all telecommunications capabilities that exist within their region and select the most cost-effective technology to meet their needs. Current possibilities include leased telecommunications lines (56KB and T-1 lines) supplied by the local telephone company, existing TV cable systems capable of bi-directional communications, district-owned fiber-optic cables extended between schools, or telecommunications lines owned by power utility companies, banks, industries, etc. Costs for the use of these telecommunications facilities vary considerably from area to area. It is recommended that a careful and thorough study be made by the district prior to selecting any telecommunications alternative. Partnerships with other groups and organizations have proven to be most beneficial in other areas of the country and within Mississippi over the past few months. See Appendix D for wide-area network specifications.

Network Traffic Consolidation Plan

Careful consideration should be given to the development of cooperative relationships with other organizations and agencies that foster the development of a "shared" telecommunications "backbone." Under an arrangement of this type network traffic can be consolidated to provide a significant reduction

in operational and transmissions costs. A backbone design should be considered that provides the capability for local schools to connect to a hub site located in close proximity, such that monthly line costs are kept within reason for the typical school budget. This can be accomplished by having area hubs established widely across the state which will in turn be connected to regional hubs that provide economy of scale in transmission capabilities. All regional hubs may be connected to a state access point or central networking center to gain access to the Internet and other regional resources at adequate transmission speeds to serve the extended needs across Mississippi.

4.2.4 Workstations

Workstation specifications and networking standards will be developed by the Technical Specifications Committee to be submitted to the Council for adoption and distribution. Network standards and workstation specifications will be reviewed by the committee and updated on an annual basis with input from a cross section of network users and participating agencies. See Appendix D for sample workstation specifications and networking standards.

4.2.4.1 Classroom of The Future

Minimum standards for classrooms of the future include components beyond hardware and software including:

- ¥ a prepared instructor
- ¥ students motivated to learn
- ¥ TV and VCR with cable, ITFS, and satellite downlink access
- ¥ voice communication line access (phone)
- ¥ wide-area network access (including Internet)
- ¥ multimedia system *see Appendix D more information
- ¥ electronic presentation/projection system
- ¥ interactive video system.

4.2.4.2 Administrative Computing

Workstations for administrators will be interconnected with local-area networks (LANs) and used to transfer student records as well as provide e-mail, file sharing, and database transactions between schools, district, regional, and state offices.

4.2.4.3 Instructional Computing

Instructional computing will primarily be confined to the classrooms and buildings on the school premises through local-area networks created through the use of file servers. Servers and routers will be configured for the most efficient network operation and will aid in preventing data directed to local workstations from spilling onto the wide-area network. Teachers will access the network to exchange information with other educators, to complete administrative tasks, and to gather research information.

4.2.5 Networking Services and Levels (data)

Networking services and levels are based upon the speed of delivery of information to the user. Interconnectivity system levels include the following:

- ¥ dialup Internet access

- ¥ 56 kbps Internet access
- ¥ 1.544 mbps (T1) access
- ¥ 45 mbps (DS3) access.

These levels of network service must be matched with user requirements and available funding to ensure maximum efficiency and effectiveness. In some cases dialup access may be the only affordable solution even though it will severely limit the user's access to graphics on Internet.

The most viable delivery speeds, when considering cost and speed, are 56 Kbps and 1.544 Mbps. Current rates for DS3 service levels are cost prohibitive. T1 is currently the best balance between cost and service.

4.2.6 Technology Management System

Technology management should be accomplished on the local and organizational level. Key items that should be addressed are as follows:

- ¥ development of network standards and guidelines
- ¥ implementation of the distance learning component and plan
- ¥ network support and maintenance
- ¥ emerging technology development responsibilities
- ¥ forecasting and planning
- ¥ training
- ¥ accountability and evaluation.

4.2.7 Information Security and Privacy

Information systems, LANs and WANs, must provide a reasonable amount of security for protection against unwanted intrusions. The primary level of security is the user's password. File servers will aid in system security by acting as a gatekeeper allowing access and distributing information. The primary barrier to intrusion is password and account-level protection. Districts must address security issues and have policies regarding information security and privacy in place when implementing networked systems. Once districts connect to the Internet, these issues take on even greater significance.

4.2.8 Telecommunications

Telecommunications is an integral part of the education technology system design in that it is the link that provides information exchange between users, instructors, and instructional providers. Fiber optics, copper wire, satellite, broadcast, and ITFS delivery systems will be the telecommunications pipelines that will interconnect computer workstations and facilitate distance learning. The Telecommunications Specifications and Operational Capacities Subcommittee Report that appears as the addendum to this document offers recommendations and guidance on telecommunications.

4.2.8.1 Data Communications

Each educational entity will proceed with plans for its own statewide network, tailored to meet its specific educational and administrative needs, but with a high degree of universal planning, coordination, and cooperation under the direction of the Council and ITS. Under this plan, each entity will maintain a high percentage of autonomy and prerogative in tailoring a network to meet its specific educational requirements, while simultaneously adhering to certain mutually agreed upon standards, policies and practices ensuring interoperability and avoiding waste and duplication of resources. Obviously, the

success of this strategy rests upon the effectiveness of the planning and coordination. Much thought and deliberation should be given to the structure, composition and responsibility of the guiding entities. Representatives from K-12, the State Board for Community and Junior Colleges, the Institutions of Higher Learning, the Mississippi Library Commission, Mississippi Educational Television and ITS would seem appropriate partners.

Given the fact that technology is a moving target and is changing at a rapid pace, it would be unwise to specify a detailed set of technical specifications in this document for an educational information network, since such specifications would become dated as soon as written. In light of this, a generic set of specifications that can evolve as technologies emerge has been presented. Where appropriate, specific technical recommendations based upon current technology and communications protocols are offered to direct the project toward a concerted effort.

The recommended data communications protocol is TCP/IP, the Internet model. The Internet model is recognized as the *de facto* standard for wide-area networking nationally and internationally.

4.2.8.2 Video Communications

The recommended video communications protocol is MPEG-2 for high quality video destined for television or ITFS broadcast, or delivery for video program post production.

The recommended video teleconferencing standard for use on interactive video networks operating below the T1 level is the VTEL algorithm, since this standard is now in universal use by the state's educational interactive video networks. All equipment should also be capable of operating with the H.320 video compression standard. The recommended video operating standard is 768 Kbps at 30 frames per second.

4.2.8.3 Interconnectivity Service

Interconnectivity should be developed through a carefully planned process of creating the most efficient and cost effective infrastructure. Options should be explored to help offset interconnectivity costs. Where it is necessary to obtain interconnectivity from telecommunications providers, an RFP should be developed through the cooperative efforts of the Mississippi Department of Education, State Board of Community and Junior Colleges, Library Commission, Institutions of Higher Learning, Mississippi Authority for Educational Television, and Information Technology Services to eliminate duplication of services and to reduce costs through collective procurement.

4.2.9 Critical Needs

Support

With a large undertaking that ties many sites together with varying degrees of expertise ranging from none to expert, it is critical to draw a plan to provide for the uniform support of both hardware and software for all users and systems administrators. If any technology-based delivery system is to be successful and self-sustaining, a significant support function must be provided. The following needs to be established in order to provide equitable and reasonable support for all concerned:

- ¥ regional help desks/service centers
- ¥ trained local support personnel
- ¥ ongoing user seminars and classes in technology
- ¥ training for teachers in curriculum integration for technology
- ¥ adequate training for an appropriate number of technical personnel
- ¥ support systems for monitoring and managing the infrastructure

Maintenance

Hardware and software maintenance is critical to continued use and success of this project. A fixed percentage of local school budgets must be allocated to maintain equipment within classrooms. State and regional monies must be allocated to continue maintenance and operation of WAN and LAN infrastructures. Maintenance issues that need to be addressed include:

- *Hardware support contracts*--using both locally and regionally based service organizations to leverage best buying power for service contracts
- *Standardization of hardware platforms*--makes it easier to acquire spares and effect local repairs in a timely fashion
- *Software support*--"Shrink wrapped" software is usually supported by vendor customer support organizations. However if sufficient quantity is purchased through a standard application definition, "preferred status" can often be achieved and dedicated vendor support can be negotiated.
- *Upgrades*--volume buying and standardization of software packages can help minimize these costs and provide ease of installation for support personnel.
- *Obsolescence plan*--needs to be developed to allow the graceful retirement of equipment and the purchase of replacement hardware with minimal financial burden.

Training

A technological infrastructure without properly trained individuals is of little value. It is imperative that a significant portion of all available resources be invested in the citizens of Mississippi in the form of training. Therefore, a commitment must be made to provide relevant up-to-date training on an ongoing basis at all levels.

Sustainability

Sustainability remains an area of critical need. The infusion of technology into the classroom will require ongoing resources. Currently, there are no consistent procedures or sources to support education technology in the state and few districts are able to direct sufficient local funds to make a difference.

4.2.10 Implementation Strategies

Goal

The creation of an effective education technology network is highly dependent on the interconnecting of fiber, wired, and wireless network technology to create a wide area network that reaches every user with the greatest efficiency and economy. It is our recommendation that this concept be a priority. It is also most important to match the delivery system to the need.

Wide-Area Networking for Data and Interactive Video

The Institutions of Higher Learning, Mississippi Department of Education, State Board for Community and Junior Colleges, Mississippi Educational Television, the Mississippi Library Commission, and Information Technology Services are committed to work together to ensure interoperability and network interconnectivity to ensure effective, efficient, and economical networking without duplication of services. Formal plans should be made to ensure that the Council on Education Technology continues to provide ongoing coordination, management, policy recommendations, and accountability. Through commitment to such a plan, the Council should continue to secure input and advice from private sector

representatives, educational practitioners, and others as required to ensure broad-based input. The Council shall continue to establish advisory committees as needed. Administrative and support services for the Council on Education Technology should be provided by one of the agencies as determined by the Council for Education Technology.

Procurement of Interconnectivity

The Institutions of Higher Learning, the State Board for Community and Junior Colleges, Mississippi Educational Television, the Mississippi Library Commission, the Mississippi Department of Education, and ITS should work together to investigate interconnectivity options, and where needed, create a process to retain network interconnectivity and switching from a qualified telecommunications provider(s) to ensure effective, efficient, and economical networking without duplication of services. Careful attention should be paid to the fact that in the near future there may be more competition in the telecommunications marketplace if proposed federal legislation is enacted that could precipitate lower interconnectivity costs. The possibility of lower costs warrants caution when entering into long-term contracts that may lock in charges even though lower cost services become available.

Technology Monitoring

The Technical Specifications Subcommittee should be maintained under the Council for Education Technology. This committee will monitor emerging technologies, evaluate new technologies that could benefit education technology networking, and make recommendations to the Council concerning the technical aspects of the networks and the need for additional communications standards and capacity.

Establishment of Local User Groups

Local user and coordinator groups should be established by each entity to ensure that the local-area networks are operating effectively from a technical standpoint.

Establishment of Wide-Area User Groups

A wide-area user group should be established by each entity to monitor the technical and operational aspects of the wide-area network provided by the telecommunications provider.

Interactive Video Network Scheduling

A system of coordination (especially for video networking) should be developed by those entities operating interactive video networks that will aid in scheduling of classes and networking and serve as a mechanism for information exchange between each entity 's interactive video coordinator.

Design and Operation of Systems

The State Board for Community and Junior Colleges and the Institutions of Higher Learning currently operate both local and wide-area networks and have the expertise to design and operate these networks. However, given the number of network sites within K-12 and the purchasing autonomy of the K-12 schools, the potential for special challenges exists in the deployment of a statewide K-12 network of this magnitude. Special consideration should be given to coordination in the design, installation, and equipment procurement process, as well as to the continuing support of this component of the statewide educational network.

Maintenance and Support

The entities should establish maintenance and support plans that consolidate services to reduce costs and request funding and generate revenue, where feasible, to fund these to important tasks.

Feedback

A system of feedback should be established to ensure the wide area network is functioning at high efficiency without duplication of service. This will also serve as a mechanism for gathering input from users to identify areas in need of improvement.

Installation Procedures

Installation procedures should be formulated by each entity to create consistent and quality facilities.

Equipment Procurement

Purchase versus lease and other purchasing criteria should be carefully evaluated by the educational entities and ITS to ensure the best economy and equipment procurement.

Detailed Specifications

A more detailed set of plans should be formulated addressing classroom equipment and infrastructure, wide area connectivity, and other technical considerations.

Timeline for Implementation

A timeline for implementation of classroom technology and wide-area networking should be developed. The classroom and school models outlined in this section should be addressed, along with the technology implementation phases outlined in the Distance Learning *Section*.

4.3 Education Accountability and Reporting System Design

The continued support of an initiative often requires that the school or district first offer evidence of its success. Accountability refers to the ability and responsibility of measuring results as a means by which to account for expenditures and the use of other resources. Reporting is defined as the collection of this measurable information arranged in a specific format for a particular individual or group. The collection, analysis, and reporting of data involves some of the most labor-intensive routines performed by administrators and teachers. Access to technologies that provide for full maintenance, reporting , and accountability can make the administration of these and other related tasks much more manageable.

4.3.1 Design Principles

The components of a statewide data collection system will be developed according to the following design principles:

- ¥ Both current and future electronic data collection systems will be utilized. This will enhance the ability of the MDE to provide more accurate and timely reports for review and analysis by educators, legislators, business leaders, parents and other key stakeholders.
- ¥ Use of the MONEX network will assist in the management of administrative processes at the local level. This will reduce paperwork and allow more local staff time to be spent on direct instruction and services to children.
- ¥ Database components will be a part of the MDE database system in which pre-determined fields and definitions remain consistent among projects. This consistency will provide for aggregation of data at the state level as well as a means by which to compare districts.
- ¥ Data that is requested on a routine basis should be retrievable in predetermined report formats. The predetermined report formats will provide easy access to information and should assist stakeholders in obtaining educational data. These formats will be designed to provide timely

feedback on student performance and achievement as measured against state, local, and national norms and standards. This information will be accessible to teachers, administrators and staff at school, district, and state levels.

4.3.2 Existing Programs

The Mississippi Department of Education uses MONEX (Mississippi Online Network Exchange), a dialup modem system of collecting and disseminating data to and from local school districts. All school districts within Mississippi have access to MONEX at the district central office administrative level. Additionally, some districts have expanded opportunities for access to all schools within the district through local-area and wide-area networks.

Current projects that are supported on MONEX and the Office of Management Information Systems include:

- ¥ local educational agency personnel reporting program
- ¥ vocational education system, teacher certification program, financial reporting, attendance reporting
- ¥ school board member data collection system
- ¥ electronic school calendar system
- ¥ child nutrition food distribution system
- ¥ child nutrition claims payment system.

4.3.3 Implementation Strategies

The following strategies will be employed to guide the development of information systems:

- ¥ The MDE will continue to convert the data collection, dissemination, and reporting procedures to standardized electronic data transfer format.
- ¥ The MDE will continue to expand the existing electronic reporting systems.
- ¥ The MDE will establish stringent deadlines for the development of new systems (see Table 4-1) including the following:
  - A student-level database program, which will fulfill the needs of the performance-based accreditation model, will provide for uniform data collection efforts for all students in the state. It will allow the state to collect data at the student level for dropout reports, graduation, and other specific reporting purposes. Efforts are underway to allow districts the ability to share aggregate district data with the state in order to aid in the reduction of the current paperload requirements on district administrators and teachers. Additional functionality includes electronic records transfer and tools to track student performance by grade and classroom. The projected date of completion is July, 1997.
  - The special education monitoring and individualized educational plan (IEP) database is designed to be a comprehensive system to fully automate the special education state and federal data collection requirements and to assist local education agencies in IEP development. The purpose of the project is to improve the quality of data reporting and to reduce the paper flow between the MDE and districts, as well as to improve efficiency at the local level. This program has been expanded to include performance variables for the performance-based accreditation system. The projected date of completion is July, 1996.
  - A textbook inventory and tracking system will be developed to track state-owned textbooks and provide an electronic medium for the timely transfer of textbooks between school districts. This system will reduce paperwork flowing between districts and provide an accurate account of textbooks available throughout the state.

Table 4-1: Education Accountability and Reporting System Design Schedule

EDUCATION ACCOUNTABILITY AND REPORTING SYSTEM DESIGN SCHEDULE	
Electronic Calendar	Sep 30, 1995
Teacher Certification	Sep 30, 1995
Enhanced Personnel Reporting	Nov 1, 1995
Textbook Inventory	Jul 1, 1995
Special Education Database	Jul 1, 1996
Vocational Education Database	Jul 1, 1997
Student-Level Database	Jul 1, 1997

- ¥ The MDE will provide Internet access for all districts to ensure adequate networking capacity as resources permit.
- ¥ The MDE will use the World-Wide Web and FTP services on the Internet as a central distribution point for connectivity and file sharing among districts. This includes continued expansion and development of the MDE Home Page. The utilization of this system could encourage local districts to develop home pages which might promote access to data by parents and community leaders.
- ¥ The MDE will review the capabilities of emerging technologies to ensure the continued expansion of the data system. It will also upgrade the technical capacity required to address these new technologies and increased reporting requirements.

4.4 Learning Environments and Facilities Planning

4.4.1 Introduction/Needs/Retrofitting

Overview

The implementation of new technologies precipitates the need to create appropriate environments for both users and equipment. Users need ergonomically-designed spaces that offer environmental comfort, appropriate lighting, low ambient noise level, security and easy access to both the overall technology environment and workstation equipment. An emphasis must be placed on reducing work-related injuries (carpal tunnel syndrome, eyestrain etc.). Equipment must also have an appropriate environment to ensure maximum efficiency of use, and to protect equipment from premature failure.

Planning for the Future

During facility renovation, new construction, or equipment installation , future technology requirements should always be considered. Installation of additional electrical power sources and wiring can make room for future equipment and thus eliminate the need to renovate when the new equipment is installed. In most cases, the infrastructure cabling represents a small cost to the project. The major cost is labor for installation.

New Construction

During the design phase of new schools and new building additions on campuses, architects should involve professionals who specialize in the areas of electrical design to ensure adequate power and power protection for computing and other equipment, voice, video and data network cabling, lighting, and especially in the case of interactive video classrooms, ambient noise level. Space must also be planned to house specialized equipment.

These same considerations should be addressed when designing new campus facilities to be used exclusively for education technology.

Remodeling and Renovation

When existing spaces must be renovated or remodeled to accept new technology, the needs assessment must be performed. Electrical power systems should be evaluated to ensure adequate power is available and that grounding is compliant for workstations. Also, air conditioning systems should be inspected to determine the ability to provide the additional cooling to handle the increased heat load presented by a number of workstations.

4.4.2 Design Principles

The design principles employed when creating appropriate learning environments and facilities should be based upon established national standards. Entities (e.g., ITS, IHL, and ETV) that have experience in retrofitting buildings to accept equipment requiring specialized environments must work in coordination with other educational entities to share their expertise on a consulting basis, and also help in the development of a facilities installation document. Special consideration should be given to manufacturer's installation recommendations.

Since many school campuses are involved in the technology implementation process, a needs analysis must be done on a case-by-case basis to determine the appropriate location for new technology sites, as well as the need for renovation and remodeling, new construction, ergonomics, and electrical and mechanical considerations.

Learning Environment Considerations

Lighting, room acoustics, ambient noise levels, and ergonomics should be addressed when considering the environmental aspects of learning environments.

Ergonomics can play a major role in increasing learning efficiency. Proper lighting and other environmental considerations all play a part in creating the most comfortable and safe learning environment. Workstations should be placed on desks specifically designed for computer use. Keyboards and monitors should be properly installed to ensure proper viewing angles and proper keyboard tilt to help eyestrain and typing fatigue. Seating should be ergonomically designed and offer proper support for extended periods of workstation operation.

Computer workstations require special room lighting considerations to reduce screen glare and the resulting eye fatigue. Most older buildings have fluorescent lights with omni-directional diffusers. These must be replaced with parabolic diffusers to reduce glare on the monitor face to reduce eye fatigue.

Low ambient noise levels are particularly important in computer labs and interactive video equipped classrooms. Workstations in computer labs generate noise from fan motors. As the number of workstations increases so does the fan noise. Acoustic absorption material can be placed on the walls to absorb some of this noise. This is particularly important in interactive video classrooms where microphones pick up student responses.

Good room acoustics are very important to provide speech intelligibility. The selection of wall material is important to help reduce echo. Highly reverberant rooms make speech intelligibility poor, making it difficult for the instructor to hear questions or responses by students. Wall treatment cost is low when considering the important improvements it would make.

Power Source Considerations

In pre-existing structures, electrical power sources for computer workstation, interactive video, and other equipment should be evaluated for proper voltage, current availability, and grounding. Older structures may not have properly grounded outlets or adequate current. A licensed electrician should be employed to evaluate electrical power and provide a written report insuring compliance with electrical codes for computer equipment. Adequate surge protection should also be installed to protect against equipment damage from lightning and power line voltage surges. For system such as servers and network control devices such as routers and bridges, an Uninterruptable Power Supply (UPS) should be considered. Critical function/task workstations should also be considered for this feature.

Aesthetic Considerations

An aesthetically pleasing environment creates a pleasant atmosphere for students and instructors. This is particularly true in interactive video classrooms where local, as well as network , participants view the classrooms. In many cases a classroom may contain the finest high technology equipment, but poor installation practices may create a look that is far from high tech. Wall and floor colors, hidden wiring , and the lack of clutter will create a neat installation that will offer students and visitors a pleasing environment that will create a good impression . Creating a good look may also enhance the possibility of future funding.

4.4.3 Implementation Strategies

Implementation strategies revolve around the development of models for computer labs, interactive video classrooms, and other technology facilities. If districts do not have the local expertise to create a high technology environment, either a model must be developed as a guide for implementation, or equipment, facilities, and building modifications must be handled from a central source, to ensure standards compliance and consistency. The following steps can be utilized to implement new education technology.

- ¥ Once all technologies and the location for those technologies has been confirmed, a needs assessment should be conducted.
- ¥ A model should be developed to serve as a guide for equipment installation, facility renovation, and ergonomic considerations.
- ¥ A syllabus should be drafted as an information resource and guide for local staff during the implementation process.
- ¥ Once equipment has been installed and facilities have been renovated, staff should be designated to inspect the new facilities to ensure vendor and contractor compliance and to ensure that the facility meets specified criteria.
- ¥ The technical appendices should be distributed to the school sites involved.

4.4.4 Learning Environment Details

Classrooms

- ¥ Each classroom should have connectivity for all media (data, voice, and video) .
- ¥ Classrooms should be fitted with 24" (or larger) TV monitors for video to be used in conjunction with CPU-TV adapters/converters for classroom demonstrations.

- Classrooms with more than one computer should be designed to facilitate easy access by small work groups of students (i.e., 2-5 students per workstation) to permit sharing of resources.
- Controllable/adjustable lighting is important to provide suitable lighting levels for viewing either TV broadcasts or computer monitors.
- Temperature needs to be maintained to protect equipment from failure and also to provide comfort for students.

Computer Labs

- Labs need to be designed to provide sufficient electrical power and temperature control to protect equipment.
- Work space should be designed to allow sufficient space for text books and other materials needed while working with computers.
- A large TV monitor should be provided for teacher workstations to enable demonstrations to large groups.
- Space needs to be allocated for printers, scanners, and other dedicated input/output devices that can be shared in lab work.
- A lab should be wired with 10% extra (spare) network ports during initial installation to allow for unexpected growth, and to provide contingencies for untimely failure of a line.
- Acoustics must be carefully considered as a large number of computers in a room can generate a significant amount of noise. Depending on the sound-dampening qualities of the room, it is possible to exceed safe OSHA-recommended sound pressure levels. The environment should be designed/tested by a qualified sound engineer.

Media Centers

- Workstations (as well as CD-ROM towers, scanners, printers, etc.) should have sufficient room about them to allow placement of reference materials and workbooks.
- Computer reference material (CD-ROMs, disks) should be readily accessible to users.
- Lighting and acoustics must be addressed (see above).
- A sufficient number of media (voice, data, video) ports should be placed as needed.
- Many times media centers are used for class presentations. Access to both the video and data network is important in facilitating these functions.
- Media Centers should provide extra network connections at reading tables for personal laptop computers to enable access to networked-based library materials (card catalogues, CD-ROM servers, Internet).

4.5 Distance Learning

4.5.1 Introduction

Distance learning is a broadly used term that has come to refer to several situations where there is a geographical separation between the learner and the teacher/instructor. Generally speaking, distance education takes place when a teacher and students are separated by physical distance, and technology is used to bridge the instructional gap.

For the purposes of this plan, the term distance learning is used to refer to an organized system of delivering educational information and materials between two or more geographically separated sites through a variety of transmission modes. In some systems, there is immediate feedback through

telephone, FAX, two-way video and audio, or computer connections. Other systems have delayed feedback. The terms "distance education" and "distance learning" are used interchangeably in the plan.

Why distance learning?

Distance learning offers a broad range of technology to serve a wide range of educational functions and makes lifelong learning opportunities accessible and more affordable. As cited by the Council of Chief State School Officers in its report, *Education and Instruction Through Telecommunications*, increasing numbers of schools are taking advantage of distance learning opportunities for their students for several reasons: declining student enrollment (particularly in rural areas), declining student performance, increasing transportation costs, otherwise unavailability of courses, equal access to educational opportunities, and taking advantage of the most efficient use of limited funds and resources.

What can distance learning achieve?

Distance learning has many advantages that can contribute to the achievement of Mississippi education goals. Among those advantages are: providing instruction to learners at remote sites on subject matter not readily available; enhancing course content through offerings such as electronic field trips and visits to resource-rich environments; connecting school-based learning to applications in the workplace; providing staff development and school management capabilities not available through other means; and supporting lifelong training from day-care worker support to adult literacy and higher education.

Distance learning will link homes, schools, libraries, and community centers with the emerging national information infrastructure.

The need for educational programming providers

Distance education offers a method of sharing resources across the state or across a school district. While this section focuses on the technology delivery systems, a strategy must be developed to provide educational programs for distance learning in Mississippi. Providing the technology without providing an avenue to develop instructional programming will seriously undermine the distance education effort in the state. Mississippi needs a wide variety of program providers to deliver instructional programs over a wide variety of technologies. Instructional providers can be K-12 teachers, community and junior colleges, university faculty, ETV, or may be purchased from other educational consortium. Funding for distance education is discussed in the funding issues and strategies section.

Appropriateness of technologies

Technology delivery should be determined by the curriculum and by student and district needs. The goal of distance education is to provide access to education that would otherwise not be available due to time barriers, lack of faculty, and funding. Mississippi must make investments in a wide range of technology delivery systems to ensure student access, to take advantage of the rapid growth in technology, and to deliver education cost effectively.

Distance education should also provide programs for Mississippi students with special needs, whether for advanced programs or for special education. Distance education should be available for individuals or classes.

The appropriateness of a particular technology should be determined by a number of factors:

- the curriculum
- the number of students to be served
- the location of students

¥ the time of day and school schedules.

Among the more widely used types of distance learning approaches are satellite transmission; broadcasting; fiber-optic and copper networks; and other wireless communications, including Instructional Television Fixed Service (ITFS), personal communications devices, wireless local-area networks (LANs), and wide-area networks (WANs).

In the educational setting, the mediums presently in wide use for distance learning include the following:

Broadcasting

This involves one-way transmission of video and audio. Programming broadcast over Public Broadcasting Services and public television stations to educate and inform viewers, instructional programming designed for use in the classroom, and staff development programs for teachers and administrators are examples of this type of distance learning, which has been available for over twenty-five years. A recent study conducted by CELT to determine the technologies being used in public schools in Mississippi found that 92% of teachers are comfortable using television as a learning tool.

Videotape Distribution

Videotapes are sometimes used for course delivery and can be a cost-effective method for delivering course content. Videotapes provide a way to reach students who do not have access to other delivery systems or face scheduling barriers. It is currently used in alternative schools and for delivery of undergraduate and graduate credit.

Satellite Delivery

This involves one-way video, two-way audio, and sometimes two-way data transmission. Credit courses for middle school through post-secondary and graduate level, as well as professional development programs for preservice and inservice teachers, are offered through this format. Satellite-delivered programs in science, mathematics, and language arts are also available on the elementary level. This delivery method is interactive in that the learner may interact with the teacher by telephone through an audio bridge, by fax, or through a computer network. VSAT (Very Small Aperture Terminal) technology is growing also in its use for data transmission.

Interactive Compressed Video Systems

These systems deliver interactive two-way video and audio and sometimes data to students and teachers. Full motion video provides a signal akin to open broadcast television. Compressed video offers picture quality similar to that of VHS videotape. Compressed video can be provided via fiber optics, copper land lines or microwave. Advantages include the ability to receive or originate from any site and the two way audio/video interactivity which other systems lack. The disadvantage, at present, is the relatively high cost of interconnectivity resulting in a high per-user cost.

Computer Networks

This involves using computers, LANS, WANS, and o n-line services, including the Internet. Because computer networks are rapidly increasing in availability and complexity, a variety of educational purposes and populations are turning to this delivery method as cost decreases and course availability increases. Desktop video and video-conferencing utilizing computer hardware accessories is employed widely in corporate business, but has not seen as yet widespread use in K-12 education. Desktop video offers a low-cost method of interactive video conferencing, but at present does not meet the demands of full classroom distance learning. While the CELT study showed that less than 10% of Mississippi's public schools are wired currently for computers, on-line delivery will become an important application in distance education in the future.

ITFS

Instructional television fixed service (ITFS) utilizes microwave technology and is frequently called "wireless cable." The state's system is currently under construction. ITFS delivers both original broadcast of programming and rebroadcast of programming from other sources.

Wireless Communications

This includes direct-broadcast satellite, broadband broadcast radio, personal communication (hand-held radios and cellular phones), wireless local area networks, and advanced television. It is expected that wireless technology will greatly facilitate delivering the National Information Infrastructure to schools and other learning sites, particularly rural and inner-city areas, lacking wired communications.

Wide-Area Networks

Wide-area networks (WANs) complement the local-area networks by expanding their reach. WANs link schools to schools and schools to educational providers (colleges, universities, *community and junior colleges*, libraries, and public broadcasting). Internet service is provided via WAN. Dedicated compressed video and multimedia can also be delivered via WAN. The statewide education technology network is based upon the WAN concept.

4.5.2 Existing Systems

Many states are developing and implementing expanded telecommunications capabilities to benefit not only the elementary and secondary schools, but also higher education, community improvement centers, public libraries, medical facilities, and state government. State initiatives that may be considered applicable to Mississippi include the following:

- ¥ South Carolina
  - Statewide broadcast television and ITFS networks provide all schools access to student instruction and staff development programming. SCETV's digital satellite system provides capacity for 32 audio/video channels delivered to schools and other sites statewide to supplement existing services. The South Carolina General Assembly funded the installation of satellite systems for all public schools.
- ¥ Iowa
  - Taking advantage of a public/private partnership, Iowa Communications Network, in three phases of work, reaches at least one end site in each of the state's ninety-nine counties, plus the three major universities and Iowa Public Television. This statewide fiber-optic network will expand to over 600 educational end points within ten years. The state built the fiber-optic "backbone," with the private sector providing the "last mile" interconnection. The system transports interactive, two-way audio, full-motion video, and data, including low-cost access to the Internet.
- ¥ South Dakota
  - The Rural Development Telecommunications Network utilizes T1 interconnect technology to provide 20 school, university, hospital and vocational technical school sites with compressed video facilities. Another fifty sites in the state have satellite receivers for reception of instructional programming, using audio return for interactivity.
- ¥ Nebraska
  - Nebraska ETV operates a statewide public television network, wire-line cable service to Omaha and Lincoln, and a digital satellite system (upgraded from an analog microwave system) to provide a wide variety of programming resources. They also operate Neb*Sat, a four-channel satellite network using satellite downlinks at schools, cooperative extension offices, corporate and government offices, and fiber optics to connect ETV with the Neb*Sat uplinks at major universities, the Nebraska Department of Education, and the state capitol.

Compressed video transmitter/receivers are located on college campuses, and ITFS transmitters serve selected communities. The satellite delivery system serves as the home base for the national Ag*Sat network that is focusing on agricultural needs.

- ¥ Utah
  - The Utah Education Network's EdNet provides interactive audio and video to elementary, secondary, and higher education institutions statewide through microwave, ITFS, and fiber-optic technologies. "Hub" sites are connected by fiber optics with standard telephone lines connecting them with sixty-five school sites, delivering sixty-one different courses. The fiber-optic lines provide capacity for simultaneous delivery of multiple, full-motion video signals between the hub sites only.

Distance Learning in Mississippi

Some current distance learning initiatives within the state include:

- ¥ Distance learning in Mississippi consists basically of broadcast instruction, satellite services, and compressed video systems. Some limited use of computer networking exists, and a statewide ITFS system is under development.

Satellite Services

- ¥ The University of Mississippi, Mississippi State University , and Mississippi ETV all have "uplink" transmit capability to receive sites; there are approximately 275 schools with satellite receive capability. The Mississippi Department of Education and ETV are partners in the Satellite Educational Resources Consortium (SERC), which provides interactive video learning to students and teachers across Mississippi and the country; ETV and Mississippi State University both produce staff development programs distributed by SERC; the University of Mississippi's Project LEAP offers a variety of courses focused on literacy.

Community College Network (CCN)

- ¥ This interactive compressed video network is located at 15 sites across the state, mostly on community college campuses. Priorities are given to rural health, community college credit courses and workforce activities.

Fibernet 2000

- ¥ Fibernet links 15 high schools with ETV, the Mississippi University for Women , and Mississippi State University for interactive video instruction using compressed video. Originally offered via DS3 interconnectivity, it is now on a T1 platform. Sites at the Mississippi Department of Education, NASA-Stennis Space Center and the UM Medical Center will be added soon. Internet delivery capability will also be offered.

Interactive Video Network

- ¥ IVN is operated by the University of Southern Mississippi. It links four sites in southern Mississippi and the UM Medical Center in Jackson; IVN provides pre-service and inservice training for educators, as well as teleconferencing capability.

EdNet

- ¥ This is a 5-channel wireless cable service that is technically described as ITFS (Instructional Television Fixed Service). EdNet is under development, with transmit cells in Jackson and the Delta now operational. EdNet is a consortium which includes ETV, SBCJC, IHL, and MDE. It is mandated to offer ITFS service to all Mississippi schools by 1998. It is a full-motion video service.

ETV

- Mississippi ETV offers K-12 instructional television services to virtually the entire state by way of "open air" broadcasting. ETV also provides college credit courses for distance learners, as well as video-conferencing.

4.5.3 Design Principles

In its report *Education and Instruction Through Telecommunications: Distance Learning for All Learners*, the Council for Chief State School Officers (CCSSO) cited five issues they deem critical to any distance learning plan:

- access to learning technologies
- training and outreach
- public/private partnerships
- statewide/multi-state applications
- positive federal actions (planning support, funding support, and favorable regulatory climate).

We would add to this the necessity of:

- interoperability--building bridges between existing systems
- inter-agency collaboration/cooperation in areas of mutual interest
- matching the need to the system; no single form of distance learning will meet all needs
- coordination by a local user group, wide area user group, and an advisory committee
- sustainability--long-range planning to ensure development and maintenance of systems is essential.

Barriers to Distance Learning

Several barriers to distance learning and recommendations for overcoming them were cited in the previously mentioned CCSSO report. A unified approach recognizing the importance of these findings is essential in Mississippi. A brief summary of the findings and recommendations follow:

- *Incompatibility of current technical systems*--The recommendation of the CCSSO is that entities involved must support and develop systems and networks that are compatible, and those institutions planning to use distance learning take special action to create organizational environments to achieve compatible integration of technologies.
- *Insufficient use of available resources*--These reasons were cited by CCSSO: the lack of access to all delivery systems everywhere; incompatibilities that inhibit integration of distance learning resources; scheduling difficulties; and the rigidity of the school day and year. It was recommended that systems be developed that are compatible, but also interoperable; that private partnerships be promoted; and that federal and state agencies, in cooperation with the private sector, develop new resources for investment and capital developments for distance learning.
- *Costs of technology*--Distance Learning involves both significant start-up costs and continuing programming and operational costs. The recommendations are:
  - develop new resources for investments
  - coordinate support from federal agencies to provide efficient and effective funding uses
  - organize planning on the part of would-be users
  - examine regulatory barriers
  - resolve issues such as educational fee structures with telephone and cable companies

- resolve copyright issues and viewing restrictions to ensure affordable rates for educational uses
- ensure availability of services to all levels of learners and maintain reasonable fair use laws by working with regulatory agencies.

¥ *Training people to use distance learning technologies*--The report cites a study conducted by the U.S. Congress's Office of Technology Assessment that reported 64% of teachers involved in teleteaching had not received any prior training. The recommendation calls for professional development programs for educators and administrators to include technical training for the use of distance learning in formal education, and for distance learning providers and users to join forces to strengthen distance learning content requirements and formats.

¥ *Course accreditation*--This issue is most critical at the high school level where state-regulated graduation requirements must be fulfilled. The CCSSO recommends state educational agencies improve course accreditation procedures to advance the use of distance learning and other alternative offerings.

¥ *Cost and accounting systems*--It is difficult for school-based decision makers to estimate or track the cost-effectiveness of using distance learning technologies including space and personnel costs. Again, the CCSSO recommends that providers of distance learning develop cost-accounting standards.

¥ *Institutional structures*--The local character of education in this country complicates the use distance learning, as in the case of teacher certification, for example. Also the organizational structure of both educational institutions and businesses often prohibits effective planning for nontraditional methods of instruction. This can be overcome by ensuring equitable access to distance learning resources, promoting public/private partnerships, improving course accreditation procedures, and taking special actions to create organizational environments that will achieve desired effects.

¥ *Programming quality*--Different skills are needed for teaching on television, and many formats tend to be "talking head" approaches. This can be overcome through professional development programs, improved course accreditation standards, and strengthening content requirements and instructional formats.

¥ *Awareness and acceptance*--Distance learning is still plagued by the myth that it offers a second-rate alternative to real instruction in a classroom. Again, strengthening course content and instructional formats is recommended. The CCSSO also recommends the local, state, and national authorities undertake awareness outreach activities to inform educators and the public of the value and importance of distance learning.

4.5.4 Benefit Analysis

The educational and cost effectiveness of distance learning technologies are determined by a number of factors:

¥ The needs of the district and the larger community as determined through the local planning process

¥ Costs of program acquisitions such as program license/faculty costs and per pupil cost

¥ Initial equipment or technology acquisition including costs of technology migration

¥ Continuing costs such as telecommunications costs and personnel

¥ Appropriateness of technology to school district needs

¥ Ability to share expertise and curriculum within the state or district

¥ Educational appropriateness of the curriculum to the technology

- ¥ Ability to serve rural areas with low student populations
- ¥ Ability to provide special education students with educational programs that districts cannot otherwise afford.

The benefits to be derived from distance learning must be carefully examined with regard to equipment and operational costs. The following section provides an analysis of distance learning systems.

Satellite Receive Sites

A receive-only satellite system can be used to receive instructional programming from many state educational entities through the ETV, Mississippi State University, and University of Mississippi uplinks. Programming from providers such as PBS, SERC can also be received.

Benefits
One-time equipment and installation cost
Reception of programming from many providers
Adaptable to multiple technologies
Reception of multiple channels

Disadvantages
Less flexible schedule
Potential for service interruption due to adverse weather
Interactive audio only

Satellite Delivery Services

Currently ETV, MSU and UM must pay for satellite service on an hourly rate. This makes scheduling contingent on satellite transponder availability. If the state leased a transponder it would be available full time for use by those state entities having uplink capabilities. Many states have opted for this delivery system as a cost-effective means of broadcasting multiple channels of instruction over their state or the nation. Interactivity is handled via telephone where students may ask questions of the instructor.

Benefits
Low cost per school served/low one-time equipment costs
No increase in delivery costs as users increase
Interactivity through conventional telephone or fax
Multiple channels
Multiple uplink sites available

Disadvantages
Same as satellite receive sites

Interactive Compressed Video

Fibernet, CCN, and other interactive video networks are now in operation in the state. These networks allow students and teachers full interactivity via T1 circuits provided by a telecommunications carrier.

Benefits
Full interactivity between student and teacher
Computer file exchange
Graphics capability
Internet access provided through same pipeline

Disadvantages

High interconnectivity cost
High start-up cost
Limited audio and video quality
Complex network switching
Limited class size

Broadcast Television

ETV provides instructional television through a statewide network of eight television stations. Nearly all schools in the state are equipped to receive ETV programming, with some wired to make courses available in more than one classroom.

Benefits
No continuing cost per school
Full motion broadcast quality video
Accessible to schools, libraries, and homes
No increase in transmission cost as users increase
Inexpensive receive system, readily available

Disadvantages
Limited air time availability
Limited interactivity (one-way passive)
Limited channel availability

On-line Computer Services

Multimedia computers are fast becoming essential learning tools in our schools. Internet is the *de facto* standard for information exchange nationally and internationally. It offers users with interconnected workstations access to vast quantities of information. Users are also able to communicate with data, voice, and limited video.

Benefits
Worldwide information access and communication
Universal communications standards
Excellent reference resource for K-12 students
Publishing capability
Limited interactive video capability
Available through conventional telephone dialup

Disadvantages
Limited network speed slows graphic intensive material
Rapid equipment obsolescence
Only 10% of schools wired for computers
Limited training available
Relatively high equipment cost per student
Relatively high maintenance and support cost
Software interoperability problems due to uncoordinated purchasing

ITFS (Instructional Television Fixed Service)

ITFS is a delivery system using wireless cable transmission as the pipeline. EdNet, an ITFS network licensed to MDE, ETV, IHL, EdNet, and SBCJC, is now accessible in two areas of the state. Special low-cost receive systems make instructional programming available to schools and other educational institutions and to home viewers. The commercial wireless cable partner will provide 1100 receivers free of charge (one per school).

Benefits
Low-cost receive equipment
Multiple channels
Interactivity through conventional telephone
Potential statewide coverage
Multiple educational entities can provide programming
Available to students at school and home

Disadvantages
Interactive via audio only
Limited programming availability
Reception limited by terrain
Dependence on private partner to provide facilities and equipment

4.5.5 Implementation of Distance Learning Plan

Mississippi has several distance learning capabilities. Fibernet 2000, the Community College Network (CCN), USM's *Interactive* Video Network, LEAP and SERC satellite projects, and EdNet are all valuable resources. While each system may serve discrete needs, it is important that these services continue to work toward full inter-operability. This will help maximize the "reach" of distance learning resources in the state. Closer coordination in areas of mutual interest will help Mississippi achieve the most effective use of the limited resources it has available.

While major universities, ETV , and others may provide important "hubs" for distance learning networks, the true effectiveness of any such statewide initiative must be measured in the field at the end user sites. Unless there is ready access to technology and the various distance learning networks in even the smallest communities of our state, Mississippi will fall short of the enormous potential that technology offers.

Accordingly, based upon benefit analyses developed elsewhere in this document, it is imperative that Mississippi consider how to realistically empower local schools and communities to be a part of the "information superhighway." School districts must define their specific distance learning needs and strategies and incorporate them into their local technology plan.

Focusing upon K-12 schools as a primary "end user" in this plan, a three-step implementation plan is envisioned that would provide the following minimum capabilities to each school upon completion.

The first stage of implementation would include (but not be limited to) the following in each school:

- ¥ television set in each classroom
- ¥ videocassette recorder for each classroom
- ¥ camcorders (number based on school population)
- ¥ personal computer at each teacher station (minimum) with multimedia capability, fax, modem, and printer
- ¥ telephone access in classrooms
- ¥ dialup access to Internet
- ¥ fax machine in each school building
- ¥ EdNet (ITFS) receive site
- ¥ PC to television set video converter
- ¥ master video distribution system for each school,

The second stage for implementation would include (but not be limited to) the following in each school:

- satellite receive system
- local-area computer network
- CD-ROM computer file server
- T1 Internet access (when required)
- Electronic media center,

The goal would be to include all of the above, plus:

- DS3 Internet/networking capability
- OC3 (155 Mbps) fiber-optic technology which is price competitive with DS3
- desktop video-conferencing capability
- interactive video classroom for each county .

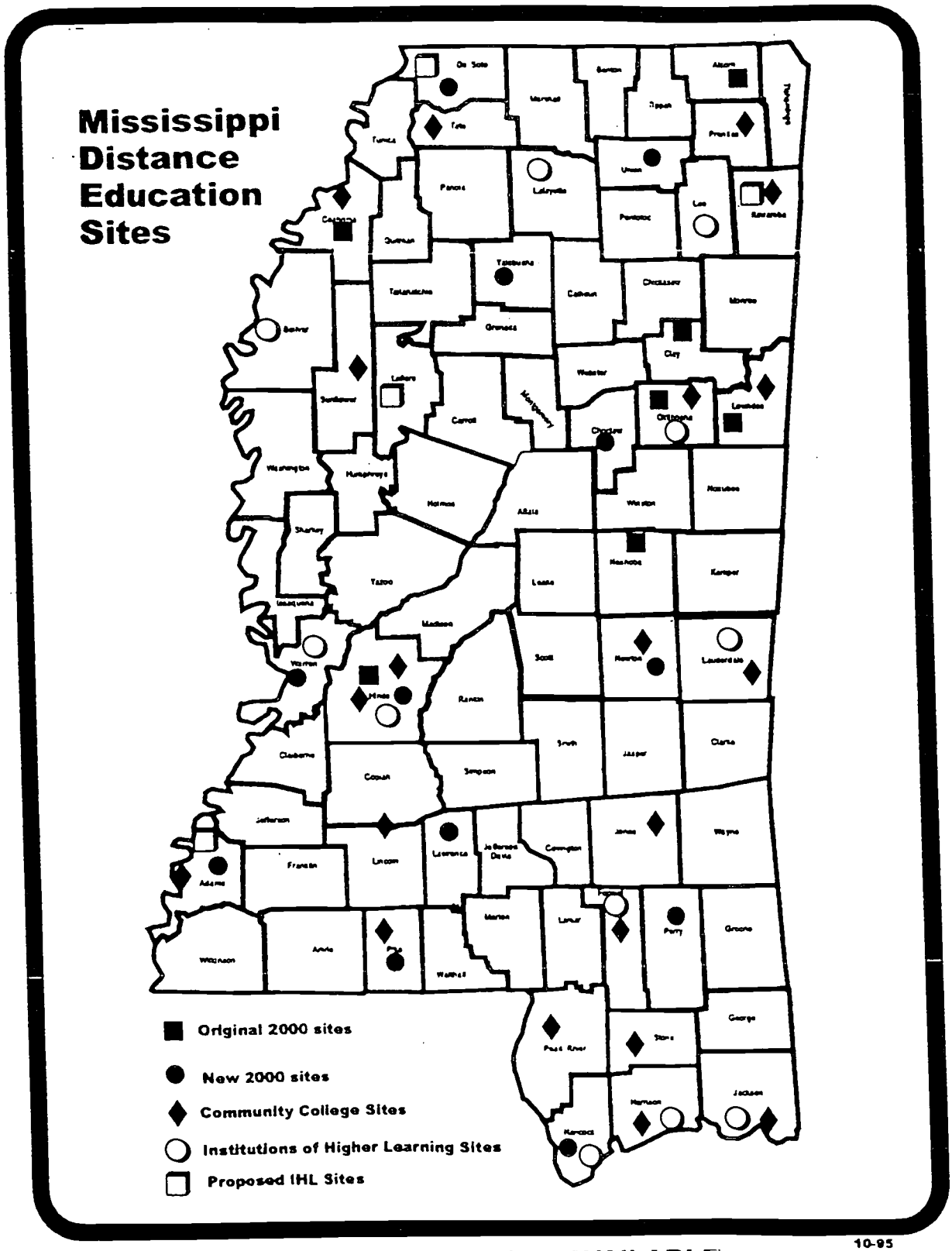
In striving to help ensure equity of access to the enormous learning resources these technologies offer, Mississippi should complete initial capabilities for every school within two years. Second stage goals would be implemented by the year 2000.

The **ideal** distance learning system will exist when every school is equipped with a satellite receiver and a master television system, and every classroom is equipped with a television and VCR, enabling students and faculty to access regular television broadcasts, plus programs and courses delivered via EdNet, interactive compressed video, and satellite. In addition, a multimedia computer should be provided in every K-12 classroom, with a ratio of one computer for every five students.

The multimedia personal computer is the heart of the education technology system for the school. With video, audio, and data processing capability, it is adaptable to many teaching and information gathering tasks. Networking these computers greatly increases the power of the system as it allows the sharing of printers, CD-ROMs, scanners, and other peripheral devices and also provides interconnectivity to the Internet for world wide information sharing. It is therefore important to coordinate the building of both the video and data infrastructure (cabling, systems etc.).

The power of this concept can be further amplified by interconnecting each of the classroom computers with a television by using a VGA to TV converter. This would allow all students to view text and graphics over a classroom TV that are visible on the computer screen. Electronic field trips via the Internet could be viewed by the entire class. CD-ROM information could also be viewed in this manner. Further expansion of this concept could involve the use of CD-ROM servers located in the classroom or school so that students could share CD-ROM information, eliminating the need to purchase software for every computer.

Learning-on-demand could be a valuable distance learning concept, as it would provide any course to any student or classroom on demand. Unfortunately, this concept requires very high bandwidths on networks. Also, the capacity and speed of computers that store the courses as data are very expensive due to the large fixed disk space required. CD-ROMs could also be used as a form of learning on demand by providing access via a CD-ROM file server. Technologists should monitor the progress of this technology so that at the appropriate time it can be integrated into the distance learning environment.



4.6 *Professional Development Plan*

> *When it comes to technology in education, you can create it, you can design it, you can produce it, you can legislate it, you can order it, restructure it, give it standards, and write outcomes for it. But the bottom line is that if it is going to happen, teachers have to make it happen.*
>
> - Jacqueline Goodloe, Washington, D.C., Teacher

Professional development programs in Mississippi need to be improved to accommodate the vision articulated in this *Master Plan*. During the data collection phase preliminary to developing this document, it was learned that most people were adamant in their belief that a statewide plan for technology professional development should be developed hand-in-hand with the infusion of education technology. The new programs envisioned are ones where educators in Mississippi perceive professional development as an exciting opportunity to learn and improve, not as a mandate. Professional development programs for technology training should be ongoing, energizing, reflective and rewarding - i.e., a system where the life-long education of teachers becomes as important as educating students. High-quality professional development provides a wide variety of opportunities for ongoing growth that enhance an individual's ability to perform as an educator and continuously promote coherent, systemic approaches to improving teaching and learning.

According to national statistics, teachers receive far less on-the-job support for training than any other professional group. Many businesses match every hardware or software dollar invested in technology with a matching dollar for training, whereas, typically, educators spend five percent of their technology budgets on training. When budgets get tight, staff development is one of the first things to go. But if teachers are to become comfortable with the technologies that can reshape schools, they must receive both preservice training during their college years and inservice training during their teaching careers. They need after-school workshops, summer sessions, and time off from their classes to learn how technology is being used elsewhere. They need to be able to observe their colleagues' classrooms and talk with them so that they can unlearn old practices and build new practices and partnerships. **Ultimately, teachers are responsible for the appropriate use of technology in the classroom. In the long run for technology to succeed in the learning environment, as much money and time must be invested in professional development for teachers as is invested in the actual hardware and software.**

Most preservice and inservice computer training presently used for Mississippi teachers emphasizes skill building, the mechanical operations of hardware, and familiarity with specific software products. The learning environment for the next century requires teachers to apply their knowledge of technology to their curricula. To reduce computer anxiety and foster genuine technological change, professional development in the use of technology in educational settings should be matched to teachers' progressive needs, abilities, and comfort levels.

What follows are some guidelines for implementing an effective professional development plan that will infuse technology competencies into the professional lives of all Mississippi educators. **The focus appears to be primarily on teachers; however, it is equally important to provide similar professional development programs for administrators, school board members, and Department of Education personnel.**

4.6.1 Design Principles

Several characteristics of effective professional development applicable to technology education have been identified through recent research studies. These studies indicate that the following strategies will promote effective professional development in technology at any level.

- ¥ Conduct professional development in school settings that support creative and multiple scheduling options (e.g., after-school workshops, weekends, release time, in-service days, summer workshops, evenings, independent study).
- ¥ Link activities and programs with other district-wide efforts by encouraging teachers and administrators to plan together.
- ¥ Emphasize self-instruction with differentiated opportunities.
- ¥ Make available an assortment of technology-based inservice opportunities (awareness, demonstration, practice, feedback, and coaching activities).
- ¥ Facilitate concrete, hands-on, and sustained professional development with opportunities for follow-up support.
- ¥ Recognize and plan for stratification of teacher skills and competencies, therefore dictating a need for diverse technology offerings.
- ¥ Allot time to develop and refine newly acquired skills with access to appropriate hardware and software.
- ¥ Include an annual allocation for technology training as part of the professional development budget.

At the local level what leads to the successful integration of educational technologies into the curriculum are professional development activities that are:

- ¥ aligned with school technology goals and vision
- ¥ timely and convenient for teaching staff
- ¥ presented by qualified individuals in non-threatening environments that encourage risk-taking and exploration
- ¥ clearly articulated with regard to content, outcomes, and prerequisite competencies
- ¥ offered at a variety of levels to address the needs and skill levels of all staff
- ¥ conducted in parallel with the purchase and installation of technology resources.

Not all of these attributes of effective professional development programs are costly or difficult to implement. All of them should be considered when designing a professional development plan with some adopted for their anticipated impact and others adapted to meet a district's or school's needs.

4.6.2 Inservice Professional Development For Emerging Roles

High quality professional development will prepare teachers for their changing roles with new basic skills. Aspects of the new roles for educators are summarized within the vision for Mississippi education presented in the Introduction to this document. The guiding principle is that, within the new learning environment, students, teachers, administrators, and communities will reshape their responsibilities and nurture their growth while at the same time incorporating new roles as necessary.

Most local school districts do not have a districtwide support system for technology that includes a full-time district technology coordinator, or building-level technology facilitator. Essentially, individual teachers are responsible of the use and integration of technology in the classroom. A well-developed

professional development program for teachers will foster effective and appropriate use of technology. High quality training programs produce people with requisite skills who can serve as resources or mentors to other educators on the local level.

The new basic skills necessary for educators in the next century were described in the section on Curriculum Improvement and Integration Strategies. In essence, teachers achieve levels of competency as they pass through stages of integrating technology into their professional lives. Therefore, multiple levels and areas of professional development must be targeted so that teachers and administrators feel empowered to use technology in the context of their own productivity. Educators who have achieved mastery of various technology applications will be more confident of their ability to respond to students' instructional needs. They will be better prepared to serve as facilitators of learning rather than mere content providers. The planning and preparation of a comprehensive professional development program, therefore, is integral to the effective use of technology to support curriculum goals and outcomes.

In essence, effective inservice professional development results in new learning, evidenced in changed behavior, which is gained by opportunities to become aware, observe, practice, reflect, and redefine new skills or redefine old skills. This requires careful planning, experimentation, and time.

4.6.3 Preservice Preparation

When technology training is defined as teaching someone how to use technology, then technology education can mean teaching someone to understand and use principles of integrating technology into the curriculum. Understanding this distinction is important because of its impact on designing the preservice and inservice technology-related education programs that teachers receive.

Implications of increased teacher use of technology in the classroom not only suggest the need for careful scrutiny of inservice professional development, but also scrutiny of preservice teacher education . Changing technology and its growing impact on the educational environment requires teachers to have a solid preservice education upon which inservice training can build. Schools offering teacher education programs leading to certification must be prepared to participate actively in the cycle of training and retraining educational professionals.

Preservice programs usually do not prepare teachers to use technology. Colleges, schools, and departments of education faculty members must develop their own literacy through retraining or self - instruction in order to integrate technology into their undergraduate education courses. They must be given opportunities to change and become skilled with technology in order to become models for practicing K-12 teachers by using technology in their teaching.

The most compelling recommendations for formal guidelines for teacher preparation programs to measure the ability to arm graduates with basic technology skills and competencies have been developed by the International Society for Technology in Education (ISTE). The ISTE guidelines, approved and adopted by the National Council for Accreditation of Teacher Education (NCATE, 1992), reflect professional studies in education that provide fundamental concepts and skills for applying information technology to educational settings.

The NCATE/ISTE materials state that one technology related course is insufficient to prepare preservice teachers to use optimally the vast array of technology resources available. Those standards also suggest that a series of courses might prepare the preservice teacher to face and apply a rapidly changing world of technology within an educational setting. For instance, progressive teacher education programs should require the following:

- ¥ A comprehensive course in computer applications that provides students with a high degree of mastery using word processing, databases, spreadsheets, graphics and telecommunications.

- A comprehensive course in instructional technology to acquaint students with the basic capabilities of various technologies available to and appropriate for education.
- The inclusion of technology in the methods courses for specific subjects. Methods courses should stress alternative methods of student assessment and strategies for classroom and/or lab management. The emphasis throughout the preservice education program should be on the infusion of technology into the learning environment and not on the hardware. It should be clear to students that the curriculum is the driving force for incorporating technology-i.e. they should receive technology education and not just technology training.

4.6.4 Certification Issues

Research supports the premise that technology education should become an important part of teacher certification and recertification. The MDE is presently considering several changes to the recer tification process. Among those changes are improvements to the methods available for teachers to earn continuing education units (CEUs). One proposed change will be to structure training opportunities in such a way that an advanced degree educator can keep his/her certification current with little or no expense by using programs offered by the MDE. The training programs offered by the Office of Technology will be developed in order to qualify for CEU credit. Therefore, teachers participating in technology training workshops offered by the MDE could be earning recertification credit.

4.6.5 Implementation Strategies

The Office of Educational Technology will provide leadership in developing a professional development plan for technology that incorporates the following components (organized into subcategories):

Leadership

- The MDE Office of Educational Technology should coordinate curriculum development with plans to integrate technology into the curriculum. As the curriculum is revised to include technology, training activities should be provided.
- Districts should develop comprehensive plans for teacher education in educational technology as a part of the district technology plan. Technology education should become a part of all professional development programs and implemented into the teacher certification and recertification processes. At least 20% of a district's educational technology enhancement funds should be used for professional development..

Program features

- The district professional development plan should focus on providing activities that are site-based and hands-on. The plan should also provide on-going support activities throughout the instructional year.
- All districts should address technology-related ethical and legal issues through professional development activities. Sessions should include development of policies regarding appropriate use of information technology, access to computer networks, copyright issues, etc.
- Professional development opportunities in educational technology should be available for administrators at all levels and for school board members. Training in the SEMI institutes should be expanded to include strategies for classroom integration of technology.
- Opportunities for preparing the staff of MDE to use educational technologies for their jobs should be available in order to prepare them to model uses of information technologies.
- University and community college-based courses in technology should be available for teachers at an affordable cost. In the absence of university credit, CEU credit should be awarded for participation in these courses.

Preservice standards

- ¥ NCATE/ISTE guidelines should become a part of preservice teacher education in Mississippi .
- ¥ Faculty in higher education institutions should be offered opportunities to develop , improve, and model their technology skills.

Support

- ¥ MDE should encourage mentoring among teachers at the local building level dealing with technology use and integration.
- ¥ Regional Resource Centers for Education and Enhancement should be established throughout the state to provide technology inservice, networking consultation, technical support, and other related services to schools and school districts.
- ¥ MDE, Office of Educational Technology, with the help of local districts , should identify and train groups of lead teachers with enhanced technology skills to build a base of expertise throughout the state.
- ¥ MDE should partner with other institutions and agencies to provide summer institutes to explore higher levels of technology application and integration.

Delivery Methods

- ¥ Technology-related professional development will be delivered via a variety of technological mediums, such as interactive video and computer-based , on-line instruction, as well as more traditional training models.
- ¥ By taking advantage of available technologies, and using them for the delivery of professional development programs, teachers will be able to use telecommunications, distance learning, field-based graduate degree programs, videotape training and independent study modules, project-based learning activities, and summer institutes as effective delivery modes for professional development.

Because of critical need for preparing teachers to use technology in their classrooms, the Mississippi Council of Education Technology established a Technology Training Task Force in July, 1995. The Task Force is composed of teachers representing K-12, community and junior colleges and Institutions of Higher Learning. This Task Force is charged with developing preservice and inservice teacher technology training standards. The Task Force is also building and implementing teacher training models to meet the technology education needs of all teachers in the state. The following is a tentative timeline for accomplishing these tasks.

Table 4-2: Teacher Training Timeline

Task	Timeline	Task Status
Teacher Task Force	July, 1995	Established
Teacher Training Standards	August, 1995	Developed
Teacher Training Model [Level One]	September, 1995	Developed
Teacher Training Model [Level Two]	October, 1995	Under Development
Pilot Training Session [Level One]	November - December, 1995	Scheduled Implementation [40 trained]
Level One Training Sessions Begin	January, 1996	Scheduled Implementation [80 trained]
Pilot Training Session [Level Two]	February, 1996	Scheduled Implementation [40 trained]
Ongoing Level One and Two Training Sessions	March - July, 1996	Scheduled Implementation [2,800 trained]
Teacher Training Model [Level Three]	July, 1996	Under Development

Mississippi Instructional Technology Standards for Teachers

The Technology Training Task Force and the MDE have developed the following set of instructional technology standards for educators in Mississippi. All Mississippi teachers should have the:

- ¥ Ability to infuse technology into the classroom to facilitate teaching and learning, to promote problem-solving and critical thinking, and to develop life-long learning
- ¥ Ability to apply technology to help manage the various learning strategies required to meet the needs of a diverse student population
- ¥ Ability to use technology in support of the instructional process and classroom administration
- ¥ Ability to use telecommunication resources and networks to enhance instructional activities, personal and professional development, and communication among all stakeholders
- ¥ Ability to apply appropriate assessment of learning practices in a technology-rich environment.
- ¥ Understanding of equity, ethical, legal and human issues of technology use as they relate to an ever-changing information society
- ¥ Ability to discuss these issues with students and to model appropriate behaviors
- ¥ Understanding of basic computer hardware and the terminology associated with technology, telecommunications and networking
- ¥ Understanding of the types, sources, and uses of quality instructional technologies related to one's subject area and/or grade level
- ¥ Knowledge of resources available for staying current in the application of educational technologies.

The technology education and training required to help teachers meet these technology standards falls into three broad categories:

- ¥ Fundamental skill building in the use of technology (technology training)
- ¥ Infusion of technology into the educational process (technology education)
- ¥ General knowledge of technology and ethical/legal issues (technology literacy)

All technology-related professional development programs should include all three of these technology training categories so that an educator can gain confidence by obtaining skills while learning to use technology ethically and legally for improving teaching and learning. Training activities should focus on how to apply technology skills into the instructional process while raising the general technology literacy of all participants. Professional development training should be designed to meet the needs of all Mississippi teachers. It should be responsive to the current levels of expertise, grade level, subject area, and available computer platforms.

In addition to the attributes of effective staff development programs, the following principles should further guide technology professional development programs in Mississippi:

- ¥ Professional development programs will be offered to help move all educators forward while ensuring high quality and consistency in the program.
- ¥ After initial training sessions begin, programs will be offered at various skill and interest levels for teachers with technology in place.
- ¥ Technology training will be available on both the Macintosh and Microsoft DOS/Windows platforms.

- ¥ All technology professional development programs will be focused on how to infuse instructional technology into the classroom by using meaningful examples, activities, and discussion related to the participants.
- ¥ Follow-up support activities will be provided throughout the year.
- ¥ The Office of Educational Technology will establish a process for identifying people who are proficient in training educators, and will make this list available to districts.
- ¥ Materials from the technology training models for each level of training will be available for review at the Regional Resource Centers for Educational Renewal and Enhancement along with videos and other training resources.

In essence, technology inservice training should compliment the changes that are occurring in the role of the teacher and should be responsive to the needs of teachers at varying stages. The statewide technology professional development model, when implemented and monitored for effectiveness, should help prepare Mississippi's educators for the challenges of 21st Century education programs.

> *While technology of all kinds has provided us with an exciting opportunity for new teaching methods and techniques, and for new ways to enhance and expand the learning experience, it is still the teacher who must make it all work.*
>
> J.L. Roberts, The Kingpin of Education, 1989

4.7 Education Technology Policy and Procedures

The importance of putting appropriate policy and procedures in place for the use of education technology cannot be overestimated. One of the key findings of the needs analysis performed by CELT was the lack of policy and procedures related specifically to both administrative and instructional technology. Although policies should be in place at all educational levels, the Mississippi Department of Education, Office of Educational Technology, must assume a leadership role in this area. Broad statewide policy statements, standards, purchasing procedures, and role definitions can serve as examples for policy development at the local district level and assist local districts and schools in establishing new functions for personnel in a changing school environment. In addition to addressing personnel role issues, the development of state standards and purchasing procedures would help to protect districts from buying obsolete or inappropriate education technology equipment.

4.7.1 Design Principles

The following design principles relate to the development of appropriate policy and procedures for the use of education technology.

- ¥ Policies established will cover topics addressed by technology and telecommunications as they relate to education.
- ¥ Policies and procedures will be designed to foster principles of universal access, cost effectiveness, economies of scale, and efficiency.
- ¥ Policies and procedures will be re-examined periodically to ensure they meet the demands of today's and tomorrow's environment.
- ¥ No policies or procedures will be put in place without justification.
- ¥ Policies will support the legal and ethical rights of all Mississippians involved.

- ¥ Except where stated explicitly (such as with laws), the primary role of policy development at the state level is to provide models rather than mandates. The state may mandate the *existence* of a policy or procedure and provide models as examples.
- ¥ Except in rare cases where exact policies and/or procedures are mandated, the role at the district level is to take the models provided and, if needed, adapt them to meet the local district or community needs and standards.

4.7.2 Implementation Strategies

At the state level, the Council for Education Technology, the Mississippi Department of Education, Office of Educational Technology, and other appropriate agencies as needed will:

- ¥ Coordinate the development and dissemination of model information policies related to technology and telecommunications. Some of the technology policy issues to be addressed include but are not limited to:
  - telecommunications access
  - security
  - ethics
  - privacy
  - intellectual freedom
  - confidentiality of data
  - software licensing and copyright
  - remote access
  - hardware and software upgrade and replacement
  - system interoperability
  - acceptable use policy
- ¥ Establish a procedure for updating information policies on a regular basis
- ¥ Provide guidelines and support for the development, evaluation, revision, resubmission, and implementation of district technology plans
- ¥ Develop and update standards annually for technology such as hardware and software, networking, telecommunications, and educational facilities
- ¥ Develop procedures for identifying model classroom practices that integrate technology into the classroom
- ¥ Establish and update policies and procedures related to distance learning and technology-related course offerings.

At the district level, local planning teams will:

- ¥ Develop and adopt local policies and procedures on technology and telecommunications issues as listed above
- ¥ Implement policies and procedures adopted by local boards on technology issues.

4.8 Technology Standards and Procurement Strategies

The fundamental purpose of this section is to present the essential components for developing technology standards and procurement strategies for implementing the *Mississippi Master Plan for Education Technology*. This section addresses the requirements established by the Mississippi Department of Education to develop and execute a technology acquisition vehicle that will deliver a quality product in a timely manner within the bounds of state purchasing laws and at the best possible price. To accomplish this objective, the Mississippi Department of Education is partnering with the Department of Information Technology Services (formerly CDPA) to design and maintain a customized

purchasing document, the *Express Products List* (EPL), specifically for this education technology initiative.

Agency/Institution Collaboration

It is imperative that schools work together at local, district, and state levels in order to achieve a critical mass that will empower them to drive the technology market and procure equipment and services at dramatically reduced rates. The Mississippi Department of Education and the Department of Information Technology Services cannot overemphasize the benefits that can be achieved by the school districts working together to standardize their technology plans and specifications. Procurement strategies and technology acquisition activities at every level within the educational community must be well-planned, organized and coordinated. Some potential benefits of collaboration , and standardization through this plan are:

- *Purchasing*--Educators and administrators can purchase hardware, software, maintenance, and support at drastically reduced prices.
- *Evaluation*--The creation of regional technology test sites will enable school personnel to become more competent technology decision makers.
- *Support*--Each school district can share technical support personnel and promote consolidated maintenance and repair agreements.
- *Training*--Concentrated training programs can be developed for professional, technical, and support personnel.

4.8.1 Design Principles

Technical standards and design principles provide a solid foundation for the collaborative planning, purchasing, training, and support efforts among the local, district and state level users. The Mississippi Department of Education is currently in the process of designing a standards-based hardware/software and network configuration model to assist the school districts in developing their technology plans. This education technology systems model is designed to:

- set minimum specifications for hardware, software, training , and support common to all local and district schools
- establish hardware, software, and network configurations for the installation of administrative local-area networks (LANs), wide-area networks (WANs), student computer learning labs, classroom configurations, and other technologies
- address the retrofitting of present resource information systems and facilities to accommodate emerging technologies.

4.8.2 Implementation/Procurement Strategies

The procurement process for educational classroom technology will focus on the standards-based hardware/software and network configuration model outlined by the Mississippi Department of Education. In compliance with Senate Bill 3350, the procurement process will:

- furnish schools with technical guidance and assistance in complying with the legal bid requirements of state purchasing laws for information technology
- maximize the compatibility of educational information resources
- acquire complete information technology solutions that will be most beneficial to the schools at the best possible price
- leverage the state's combined purchasing power resulting in the best possible discounts for the schools and the state.

For each category of technology defined, the Mississippi Department of Education and Information Technology Services will recommend setting an evaluation criteria to establish two vendor lists from which the schools can make their selection. The approach taken in this process will be similar to the methods and procedures used by the state in establishing its various Express Products Lists (EPL) for technology purchases.

Under the EPL format the first list will include technology which is deemed as an enterprise (tier 1/tier 2) -- that is, products based on high quality, financially stable, low risk manufacturers and products. Information Technology Services currently subscribes to the services of the Gartner Group, a leading supplier of tactical and strategic analysis and data on the information technology industry. The Gartner Group's tier 1 and tier 2 ratings represent the very best manufacturers and products in the industry. The second list will include those manufacturers and products that are typically deemed as an economy product based on industry ratings by the Gartner Group as tier 3 or below.

The Mississippi Department of Education and Information Technology Services realize that some school districts place a premium on acquiring technology, services , and support from dealers on the local level. It is recommended that this factor is taken into account in the bidder selection process. Therefore, the selection of eligible bidders and technology for both the enterprise and economy lists shall follow a two-pass evaluation.

The first pass will follow the state's current EPL selection methodology of rating bidders and technology offerings on a statewide basis. Two lists will be established based on the highest scored bids. The scoring of total points is facilitated by a formula that is a function of credit given for the best technical offerings at the best price. Information Technology Services currently establishes its selection cutoff plateau at the top 30 percentile. This allows a rich list of manufacturers and products for both the enterprise and economy lists without having agencies and institutions pay a premium for the technology. The actual cutoff points for the Mississippi Department of Education is flexible, but is not recommended for expansion below the top 30 percentile in any category. Rather, an approach is suggested in deference to the local dealer option for school districts.

In addition to the statewide enterprise and economy lists, local lists are suggested for compilation taking the top percentile for bidders and technology on a district-by-district basis. By district, Information Technology Services recommends dividing the state into local purchasing zones following the five Congressional districts. Thus, the statewide list could be complimented by those local dealers who scored among the top enterprise and economy percentiles within each district. The schools could make their selection from a list comprised of vendors within the statewide or district list for either enterprise or economy bidders and products. This process will allow the widest possible selection for the schools and allow the broadest range of local bidders and still ensure price competitiveness.

4.8.3 Vendor Interaction

Vendor Education

The Mississippi Department of Education and Information Technology Services desire to develop a partnership with the vendor community to achieve, through the bid process, a multivendor list of hardware, software, and services that affords the schools the widest range of technical selection at the best price possible. So that all bidders, local and statewide, are allowed to compete on a level playing field, the Mississippi Department of Education and Information Technology Services will host bidder information sessions to explain the EPL bid process and answer questions. The bidder information sessions will be scheduled no less than twice a year by the Mississippi Department of Education and Information Technology Services.

Vendor Input

An important factor in ensuring the success of this technology initiative is the correct level of vendor participation. The ultimate benefactor of the EPL bid process must be the schools, their students and staff, and the taxpayers. The vendor community can exercise a measure of quality assurance over the success of this project by being allowed to review the goals and objectives of this technology initiative. Vendors must also become familiar with the bid methodology and offer constructive input to the procurement process. This input can be weighed and incorporated into the bid process before the final technical specifications are set. Once the specifications are established, vendors will be fairly knowledgeable with the bid process from advertisement to final awards and contracts. To this end, the Mississippi Department of Education and Information Technology Services must move quickly to host public hearings on the technology issues constituting this project.

4.8.4 Cost Issues

Contracts

A turnkey contract outlining the aspects of a systems implementation, from order placement to installation and demand for payment, will be included with the specifications. All selected bidders will be allowed to execute a master contract with the Mississippi Department of Education and Information Technology Services that will govern the manner in which all technology equipment and services will be ordered, delivered, installed, approved, paid for, and inventoried. With these global contracts in place, the local school districts will need only to issue purchase orders under these contracts to enjoy their full protection. The Mississippi Department of Education and Information Technology Services will support the school district by working with the district and the selected vendor to negotiate and resolve any problems that may arise over the term of these contracts.

It is recommended that the initial term of these global contracts not exceed one year. It is acknowledged that qualifying vendors will be required to honor their prices for one year. However, due to the nature of the technology market, there will be price decreases and model improvements made during the year. Bidders will be expected to pass on these price and product improvements under the philosophy of a "best value" agreement as the contract year progresses. Under no circumstances should this contract be considered valid for a period of more than one year without departmental review and approval. A new series of bids should be issued on an annual basis to reflect new prices and technologies at the end of the initial contract term.

4.9 Roles and Responsibilities, Staffing Positions, and Organizational Structure

In order to create and sustain an effective education technology system for Mississippi, the active participation and support of a number of stakeholders is required. While educational institutions must play a leadership role in both designing and sustaining an education technology delivery system, its ultimate success depends upon considerable participation and support from parents, the business community, and others who have direct or indirect interests in school improvement.

4.9.1 Mississippi Department of Education

The Mississippi Department of Education is the lead organization in the development of a coordinated technology system for K-12 public school districts within the state. The first step in responding to the MDE's obligation is to provide methods for making appropriate technology available to public schools throughout the state. The development of this *Mississippi Master Plan for Education Technology* provides initial impetus for this initiative.

It is essential that the MDE provide the leadership that demonstrates commitment to the use of technologies as a critical part of the teaching/learning process. Such leadership responsibilities require the creative use of technologies in solving long-standing problems, while creating inventive options for designing new learning opportunities. Leadership from the MDE should range from vision acquisition and dissemination to such practical areas as application, curriculum integration, policy and guideline development, training, evaluation, funding research and analysis, and ongoing planning activities.

Staffing must be provided for the Council on Education Technology, for the Regional Resource Centers for Education Renewal and Enhancement, and for individual schools, colleges, universities, libraries, and the educational television provider. In many instances, providing staff will not require employment of new staff members but simply reallocation of time and/or training. It is also critical that sufficient staff be employed to manage any networking responsibilities.

Parents, community leaders, members of the private sector and other constituents should be included in designing plans for technology use and in creating technology assistance. These important constituents should become both designers and users of technology. Our schools, colleges, and universities must reach beyond the normal walls and boundaries into an active community which needs the benefits that can be bought through technology systems and personnel. In considering important participants, it should also be remembered that some of the most effective teachers of technology use are students.

One of the most important challenges in ensuring the best and most economical use of technology is attaining the right balance between freedom that allows creativity and the creation of controls that eliminate unnecessary duplication and waste. The Council on Education Technology represents a realistic approach to deal with this special challenge. It is essential that representatives of the primary users of education technology are good planners, effective coordinators, and innovators. Accountability is essential to successful operations. The Council shall develop both long range and short range goals and plans to meet the telecommunication needs of the state in consultation with the public, appropriate state agencies, educational institutions, private industry, and other entities.

Implementation strategies dealing with funding, staffing, program development, and information dissemination must be considered. Adequate funding is required for securing technology and for successfully using technology. Funding must be provided to ensure sufficient coordination to cover maintenance costs, provide for systems management, staffing, training, and for networking costs. The absence of any one of these elements may prove to be the source of failure for the entire initiative.

4.9.2 Institutions of Higher Learning

The responsibilities of the Institutions of Higher Learning in Mississippi include: to prepare preservice educators to infuse technology into curriculum; to provide professional development opportunities to teachers, principals, superintendents, and school board members in Mississippi; to continuously evaluate the impact of technology on K-12 performance; to provide support in district planning; to deliver courses via distance learning; and to evaluate new technologies.

4.9.3 Community and Junior Colleges

Community and junior colleges are especially well situated to provide an array of services related to implementation and support of the education technology system. Their geographic distribution and close association with their communities present unusual opportunities for coalition and capacity building. As an extension of the two-year institutions' present leadership role in providing workforce training, the colleges must utilize technology to respond to other business and industry informational requirements. Community and junior colleges also should be involved in staff development and technology training for both public school and private sector populations.

Additionally, the State Board for Community and Junior Colleges (SBCJC), in its role as the coordinating entity for the state's public two-year colleges, plans to develop networking capabilities that will allow for

the interconnection of the networks operating out of the state IHL and ETV offices. The SBCJC is ideally suited to act as the connection point for these networks due to their location in Jackson.

4.9.4 Mississippi Authority for Educational Television

The Mississippi Educational Television (ETV) will continue its traditional role as the primary deliverer of statewide, one-way, informational and instructional programs. Additionally, ETV should expand and redefine technology employment as it relates to both formal and informal educational programming, including distance learning initiatives as described in *Section* 4.5 of this document. ETV, in close cooperation with the MDE, IHL, and State Board for Community and Junior Colleges, should also be deeply involved in responding to staff development needs and technology awareness for the state's educational entities at all levels. With ETV's oversight responsibilities for both the EdNet (ITFS system) and Fibernet (MDE's two-way interactive video system) networks, it should ensure the most complete and appropriate utilization of these resources.

4.9.5 Library Commission

Libraries throughout the state constitute an extremely important learning resource for people in Mississippi. If these libraries are to serve Mississippi's communities well, they must continue to increase and expand their use of technology. The Mississippi Library Commission must provide leadership that deals successfully with planning, education and communication, connectivity with public schools and educational institutions at all levels, technology applications, utilization, and marketing. Through the use and management of technology as well as the establishment of new partnerships with education agencies and institutions, the Library Commission and its member libraries can bring a world of new information to communities throughout the state.

4.9.6 Department of Information Technology Services

Economy and efficiency of a complex, ever-changing technology system requires considerable attention to the areas of accountability, interconnectivity, and purchasing. Additionally, such systems require oversight, the establishment and compliance of standards, and problem resolution. The Mississippi Department of Information Technology Services (ITS) is ideally staffed and situated to assume these important responsibilities to state entities involved in the master system, and to a lesser degree, to the local educational entities. ITS has entered into a cooperative agreement with the MDE to support the establishment of statewide purchasing standards and contracts to support education technology initiatives. The role of ITS is further expanded and enhanced by its authority to approve this *Master Plan*. According to HB2945, in addition to approval by the State Board of Education, the *Master Plan* must be approved by ITS.

4.9.7 Regional Technology Leadership

Sharing information, support, and resources throughout the state must be organized effectively. Regional consortia, which not only bring public schools together, but also add the talent and resources of colleges and universities, can address implementation and use of various technology applications and techniques. New and existing consortia can also be instrumental in exploring new and exciting technological innovations. It is recommended that the MDE, in conjunction with the Council on Education Technology, work with these groups to provide support and leadership on technology-related programs on a regional basis.

4.9.8 Local School Districts

District leadership must commit sufficient financial resources to ensure successful use of technology, and it must encourage and provide staff development and other staff learning experiences required for successful implementation of technology supported initiatives. The creativity of teachers and other staff

members should be directed toward finding the best ways to integrate technology into curriculum and in designing the best ways to ensure that students have the necessary skills and understanding required for success. As previously stated, in order for districts to succeed in technology utilization, there must be at least one staff person available to resolve problems, create understanding, and to ensure effective applications.

The following paragraphs summarize the anticipated roles and responsibilities of various local district staff and stakeholders involved in the successful implementation of technology initiatives at the school level.

Superintendent and Other District Administrative Staff

This role is one of providing leadership and vision to the district, school, and community. This leadership will involve:

- ¥ actively participating in the technology planning efforts
- ¥ modeling the appropriate and regular use of technology
- ¥ communicating frequently concerning the importance of technology planning and implementation efforts
- ¥ providing full support and encouragement
- ¥ creating favorable conditions for experimentation
- ¥ providing incentives, time, and space for adequate professional development.

In summary, the role of the superintendent and administrative staff is to marshal all available resources to facilitate effective technology planning and implementation.

Principal and Other School Administrative Staff

Principals are charged with the responsibility of translating the future into today's schoolrooms, and technology will be a large part of that future. Their role is similar to the role of the district administrative staff. However, at the school level the role becomes more focused on the instructional processes and the use of technology to enhance learning in specific classrooms and curricula. The principal must develop:

- ¥ an understanding of the technology
- ¥ a working knowledge of the process for incorporating technology into the school
- ¥ an understanding of appropriate instructional strategies for using technology in the classroom

The principal and school administrative staff must be comfortable in the role of change agent and have the political skills to make changes in the instructional work pattern with teachers.

In addition, the principal must motivate teachers to acquire the knowledge necessary to incorporate the use of technology in the curriculum. "Principals who advocate the use of technology in their offices and schools without using technology themselves are sending a very hollow message. " Schuster (1993). David Thornburg and Alan November define the basic set of skills for administrators as the following:

- ¥ use of application tools (e.g., word processing, database, spreadsheet)
- ¥ use of telecommunications
- ¥ a general understanding of multimedia
- ¥ a general overview of remedial software and simulations
- ¥ some sense of networking.

The success of local school districts in utilizing technology as instructional and administrative assets largely depends on the level of commitment made by the school board and superintendent. Top leadership must strongly communicate to staff and parents a commitment to the development and use of technologies. Emphasis should be placed on creative uses of technologies in designing solutions to both old and new school-based problems. Technology usage must be applied and driven by teachers and students.

4.9.9 Schools and Teachers

Teachers are the key to the success of implementing technology in the schools. When technology is introduced into the classroom, the role of the teacher and the student changes. Teachers become facilitators and coaches and promote activities involving small groups of students working cooperatively on open-ended activities requiring interdisciplinary awareness and multiple resources. The Christa McAuliffe Institute for Educational Pioneering has identified five key roles for technology-using teachers of the 1990s:

- The **collaborator** shares knowledge with colleagues and initiates and nurtures relationships that expand the boundaries of the classroom.
- The **mentor/mentee** teaches and learns from students, the community, and colleagues.
- The **planner** creates a vision of the future, develops methods to achieve that vision, and structures the revised learning environment.
- The **researcher** accesses, analyzes, and organizes information in order to guide students in understanding problem-solving strategies and developing discovery learning skills.
- The **seeker** ventures outside the classroom to gain new ideas and resources.

Teachers go through varying phases as they begin to use technology in their classroom. *The Apple Classroom of Tomorrow* has documented five stages that teachers go through as they make greater use of computers in the multimedia classroom environment. The patterns of instruction evolve through **entry, adoption, adaptation, appropriation, and invention.**

Technology Coordinator

In order for districts to succeed in technology utilization, there must be at least one staff person available to resolve problems, create understanding, and to ensure use of effective applications. Often this role is filled directly by a teacher who is motivated (either personally or financially) to initiate technology uses in the school setting. The MDE has requested that this type of responsibility be filled at the district level. However, at the school level such a position is also critical. When establishing such a position at either level certain responsibilities must be taken into consideration.

The responsibilities of the technology coordinator fall into four main categories: coordination, communication, training, and support. Technology planning committees, team/ focus group meetings and plan development activities all require careful coordination. Communicating with educators about the creation and implementation of the plan, with teachers about available resources, and with parents, students, and business members is a critical task. Providing training opportunities on topics such as hardware, software, curriculum integration, and evaluation of technology solutions are also responsibilities of the technology coordinator. In addition the coordinator must offer technical and educational support services to the school/district in conjunction with the district technology plan.

4.9.10 Parents, Community, and Private Industry

During the needs analysis, the CELT consultant team conducted extensive interviews across the state and found that parents were most supportive of the infusion of technology into the schools. However, many felt that they had not had adequate input into the planning process. Community members and

business supporters shared the desire to become more involved in the planning process, stating the need to share public resources and investments across the agencies. History has demonstrated that people are more likely to appreciate and use an innovation that they have helped design according to their own needs than one that is forced upon them. Change is about people. Good technology planning pays attention to the needs of the education professionals, to children and parents, to taxpayers and citizens, and to private industry leaders and involves all these groups as stakeholders.

4.9.11 Design Principles

Key design principles for the infusion of education technology into the curriculum, the classroom , and the administration of schools include:

- ensuring adequate and qualified staff and faculty
- developing infrastructure to meet current and future needs
- providing a sound financial plan for initial deployment of technology as well as for ongoing implementation support. The financial plan must recognize ongoing costs in telecommunications and other areas
- developing support for the education technology and its infusion in the classroom and at the administrative level
- providing training for faculty, staff, and administrators in the integration of technology into the curriculum, and its use in administrative functions
- ensuring accountability in terms of costs principles as well as evaluation programs.

4.9.12 Implementation Strategies

Considering the complexity of instruction and the limited understanding on the part of many potential users of technology support tools, it is essential that those involved in designing and managing technology develop plans that will ensure the most successful implementation at their level of education. Such plans must take into consideration differences in support needed at different phases of the implementation process, and the need for creating responses to unanticipated problems that will certainly arise. Most of all, strategies dealing with technology utilization must comply with the basic premise that technology is a tool to enhance education and is not an end in itself. Every effort should be made to ensure that the needs of all types of users be determined and considered in developing implementation plans.

Implementation strategies and planning will vary from one entity to another because needs will vary among the educational partners. Nevertheless, there are certain time-honored strategies which should be remembered including:

- ¥ pilot programs
- ¥ consortia with broad representation
- ¥ utilization committees
- ¥ seminars
- ¥ public/private partnerships
- ¥ curriculum integration committees
- ¥ train-the-trainer projects.

Partnerships with universities, community and junior colleges, public education, libraries, ETV, and ITS will contribute to the pool of talent that provides support for implementation strategy building. It should also be remembered that students have proven to be invaluable resources in training and problem

solving. Most importantly, implementation strategies must be monitored carefully with an eye on the adjustments needed for acknowledging technologies or unanticipated instructional program requirements.

4.10 Program Monitoring and Evaluation Plan

The purpose of monitoring and evaluation is to ensure that the:

- ¥ intent of the legislation in Senate Bill 3350, Technology in the Classroom Act, is being fulfilled
- ¥ resources invested in education technology are being expended wisely, effectively, and efficiently
- ¥ established technology goals are being met.

Because technology planning is an ongoing process, successful technology plans build in periodic, systematic monitoring and evaluation processes that enable examination and resolution of issues as they arise to improve programs as they progress. All program components must be monitored since there are many interdependencies among different parts of the technology plan.

4.10.1 Design Principles

It is essential that the implementation of the *Mississippi Master Plan for Education Technology* be monitored, documented, and described carefully, and that the resultant impacts be validated in a comprehensive and rigorous manner. The ongoing evaluation of the various programmatic initiatives described in the plan is built on two primary and three secondary design principles.

Primary

- ¥ *Process evaluation*-- Provides an ongoing feedback loop for decision makers during implementation of a new technology program. Such evaluations provide the data needed to make improvements in the design and implementation of the program. For example, key decision makers should be informed on a frequent and regular basis of progress on implementation including any adjustments that have to be made.
- ¥ *Product evaluation* -- Measures the degree to which the program is having the desired effect or producing the anticipated results. It contains six major components:
  - definition of desired outcome
  - development of an outcome measure
  - tracking of progress
  - data collection and aggregation
  - analysis
  - reporting to stakeholders ,

Secondary

- ¥ Evaluations will relate to the goals set forth in the legislation and the state plan, such as school improvement, student achievement , and access to individual instruction.
- ¥ Evaluation of technology support systems will use criteria in support of curriculum reform.
- ¥ Evaluations will be coordinated annually by the Office of Educational Technology using cross-departmental teams and educational agencies where appropriate.

An effective evaluation system must provide relevant information to the individuals responsible for the continuation, alteration or termination of the program or application in question. To this end, a system for evaluating technology programs should follow these guiding principles:

- ¥ Determine the audience.
  - Evaluation is used as a tool for making recommendations, thus the key decision makers and important audiences (e.g., teachers, students, parents, administrators, etc.) must be identified. These are the "consumers" of evaluation.
- ¥ Determine the flow of information.
  - An effective evaluation system must also determine the frequency and mode of information transfer to and from decision makers. Technology should be used to enhance this exchange. For example, electronic messaging, data transfer, and presentation should supplement more traditional modes of communication such as memos, letters, and reports.
- ¥ Develop a documentation system.
  - Evaluation systems must be flexible since the programs they measure are subject to frequent revision. Thus, documentation of a programmatic evaluation becomes crucial as it undergoes inevitable change. Technology (e.g., software) emerges again as a necessary tool to provide effective project management.
- ¥ Identify desired outcomes and measures.
  - The evaluation system must include a detailed description of anticipated outcomes. In addition, it must provide for unexpected benefits as well as possible negative effects of the program or application being implemented.
  - The determination of desired outcomes must be accompanied by the development of means by which to measure those outcomes. These measures may be collected using quantitative and/or qualitative methods. Data could include measures already collected for other purposes as long as they accurately operationalize the desired outcomes. All measures should be designed and collected prior to implementation so as to establish a baseline by which to assess change.
- ¥ Provide for data collection and analysis.
  - An effective evaluation system must clearly define when, where, and how the data will be collected and who will compile it. Strict timelines should be established to ensure that the data collection and analysis process runs smoothly. Technology is essential to this process as a tool for both data collection (e.g., electronic transmission of survey responses, data transfer, and qualitative collection through electronic bulletin boards) and analysis. Data collection and analysis hardware and software should be carefully reviewed to ensure that it has the capacity to accommodate the size of the dataset.
- ¥ Provide for reporting and accountability.
  - Reporting schedules should be carefully planned to correspond with decision-making schedules. The effectiveness of these reports should be measured by the degree to which it provides useful information for decision making. The most recent technology should be utilized in compiling these reports so as to convey information through visual and graphic displays as well as text. In some cases, oral or visual reports may be preferable to print.
- ¥ Translate evaluation reports into action plans
  - Evaluation efforts are useless if their results are not used to facilitate programmatic change. The evaluation system must include a predetermined process by which to review findings, make recommendations, determine level of need for recommended changes, set priorities for prescribed changes, estimate cost of the changes, and determine who will implement the changes and when.
- ¥ Determine evaluation responsibilities.
  - The evaluation system must include detailed assignment of the parties responsible for each step of the process. Care must be taken to ensure that the individuals responsible for each step have adequate training. For some steps, such as data collection, tasks can be

performed by school personnel. Other steps, such as analysis, may require more extensive expertise.

4.10.2 Implementation Strategies

Coordination of the comprehensive process and product evaluation system will be accomplished through the Office of Educational Technology. The system will assess the implementation of initiatives set forth in this document as follows:

- ¥ Evaluate the *Master Plan* on an annual basis by the MDE and school districts.
- ¥ Conduct a process evaluation of the following statewide initiatives:
  - curriculum integration and improvement
  - education technology system design
  - learning environments and school facilities
  - distance learning; reporting system design
  - professional development; policy and procedures
  - standards and procurement strategies
  - organizational structure and staffing
  - funding strategies
  - implementation phasing and staging.

  Measures from each of these categories will be collected, analyzed, and reported to key decision makers, including legislators, on a semiannual basis.
- ¥ Conduct a process evaluation of the following local initiatives:
  - local technology planning process
  - roles and responsibilities of organizational structures and staffing
  - processes in place for local monitoring and evaluation.
- ¥ Emphasize outcomes/benefits (e.g., improved teaching and enhanced learning) from the product evaluation perspective.
- ¥ Aggregate data and information across initiatives in order to create a holistic picture that reflects the impact of the overall effort.
- ¥ Involve all levels of the MDE in the process of evaluation system design, collection , and reporting. Train administrators and school-based staff in evaluation methodology to increase their awareness of the usefulness of evaluation and prepare to assume responsibility for various aspects of the evaluation process.
- ¥ Implement use of the most recent hardware and software to ensure efficient data collection, analysis and reporting.
- ¥ Develop a system of communication between evaluators and decision makers that is consistent and bi-directional to ensure that the evaluation system provides useful information in a timely fashion.

5. LOCAL TECHNOLOGY PLANNING

5.1 Overview

The face of education is changing constantly—and rapidly. Coupled with the dynamic nature of educational change is the perpetual metamorphosis occurring with regard to technologies. The pragmatic infusion of technologies into instruction holds the potential to result in significant, measurable improvements among all who engage in the learning activity.

Technology cannot be worshipped as a unique, separate entity. Educators must ensure that the focus is on the individual learner first, followed by the curriculum. Then, and only then, should technology be brought into the picture. As long as technology is a tool for learning, conceptually and practically, positive benefits will accrue. Planning is essential if school districts are to make the wisest, best use of technologies. Too many poor decisions have been made, historically, that have resulted in a waste of financial resources. Effective, strategic local technology planning will reverse this practice.

*Planning is a **process**, not a **product**.* This statement of belief has been repeated frequently and adopted as a basic philosophy by many educators. Technology planning at the local level, especially, must be a perpetual event upon which final closure is never reached. Planners will stop periodically and adopt precepts upon which mutual agreement has been gained up to that point. An essential concept is that technology planning efforts are never finished. There is always opportunity to improve and strengthen the plans, as the results of ongoing evaluation are injected into the process.

For purposes of satisfying the requirements of *Senate Bill 3350*, local school districts will develop a written technology planning document, acquire local school board approval, then submit it to the Mississippi Department of Education (MDE) Office of Educational Technology. Districts will receive feedback from the MDE if their plan contains components that need to be improved, clarified, or modified. Once approved by the Office of Educational Technology and the State Board of Education, the funds will be distributed (see guidelines document for exact procedures for distribution of funds). The planning process will include a recommended annual update feature so districts can continue to gauge their instructional improvement strategies.

Mississippi educators who were involved in the writing of this section of the *Master Plan for Education Technology* offer several words of caution and reminders about the planning process:

- The time required for effective planning is extremely important; local districts must consider offering release time for planners to engage in planning activities.
- Planning is just that—*planning*. Nobody expects this to work the first time with no problems.
- Give enough room in the planning process to work around problems and to foresee other problems.
- The process needs to involve everyone in the local school community (e.g., students, teachers, administrators, parents, community members).
- Students' ideas about the process are particularly important. Schools should seek unbiased opinions about the process they are using.
- The process should be systematic.

Developing a local technology plan is not an easy task; few truly important activities are easy. The process can be managed in such a way that the entire educational community is brought together to revisit what they deem really important about instruction—all this dialogue can occur with technology as the core.

5.1.1 Coordination of District Planning with State Planning

School districts will be engaged in their own planning efforts, but will maintain close communications with the MDE Office of Educational Technology personnel so their plans are aligned with state initiatives. The Council for Education Technology, in cooperation with the Office of Educational Technology, has established, and will continue to establish, specific guidelines that must be followed as instructional technologies are implemented throughout school districts. The state-level function will require that local district plans interface directly with state plans.

To provide needed technical assistance from time to time, each school district must have a technology coordinator or specialist who serves as a main point of contact with the MDE. It is recommended that districts take the appropriate steps to make the position of technology coordinator an administrative position, funded in the regular school budget. The needs of the schools will be served in a much more effective, efficient manner through the coordinated efforts of the technology coordinator.

5.1.2 Levels of Planning

Classical technology planning models include multiple layers of planning activities. Not only does planning occur at the state level, but occurs at the local level as well.

Each school district should develop a technology plan that encompasses the technology goals of the district. Although not required, plans should be written for each school building/site within the district. These building-level plans should interface directly with the district plan. A trend that is surfacing, as reported by the National Center for Technology Planning, is planning at the classroom level. Increasingly, teachers are developing their own technology plans to establish visions, missions, and goals that drive how they incorporate technology into their day-to-day classroom practices.

5.1.3 Historical Pitfalls

Since the advent of affordable technologies less than two decades ago, millions of dollars have been spent on the purchase of computers, software, and associated peripherals. Often, though, these expenditures were not well planned. Sometimes, purchases were made on the spur of the moment, especially after a vendor had given a flashy demonstration or offered some special pricing to a school. Rarely were these purchases correlated with any instructional intent; it was just some neat "stuff" that could be purchased and put into the hands of teachers and students.

In many schools, computers were installed in administrative offices only. Teachers had to become perpetual pests in order to acquire technologies they needed for instruction. Federally-funded projects were often recipients of computers, but teachers received no training that would equip them with the knowledge of how to apply the technology to diverse learning situations. The Council for Education Technology wants to ensure, as much as possible, that these horror stories are mere remnants of the past -- that is, that no such scenarios occur henceforth.

5.2 Design Principles

The preparation, organization, and effort that accompanies any strategic planning activity typically pays dividends in terms of time, energy, and resources to achieve desired goals. This is especially true relative to education technology planning at the school or district level. Acquiring and implementing education technology effectively to enhance both student and teacher productivity involves a major transformation from what might be considered traditional educational strategies. It is important that a systematic process for enacting change capitalize upon early innovations, successes, and also failures if scarce educational resources are to be spent wisely and expeditiously.

It seems clear from other education technology planning efforts that success can be realized when full attention is directed toward curricular and instructional goals. Curriculum improvement strategies, impacting all students, must be the cornerstone for education technology integration efforts in schools.

This document provides detailed guidelines for the design, development, and implementation of local education technology planning efforts for all schools and districts in Mississippi. It includes:

- critical factors that are essential for effective technology planning to occur at the local level
- a local education technology planning model that has demonstrated success in helping other schools and districts around the country (Appendices E, F, G)
- strategies and support services to assist schools and districts in various stages of planning for education technology
- recommendations for initiating a statewide approval and monitoring process .

5.3 Plan Components

Technology planning documents prepared by school districts must be documents of utility. Plans, in their noun form, must be tools that are used by all in the district. For this to occur in a realistic fashion, the plan must include some basic, standard components. To achieve maximum effectiveness, a local education technology plan should be a collaborative educational and community effort. Various working groups and constituencies are able to contribute to those aspects of the process that take advantage of members' special expertise or perspectives. Components of **all** comprehensive, long-range district education technology plans submitted to the MDE Office of Educational Technology , should include the following at a minimum:

- ¥ vision/ mission statements
- ¥ assessment of needs
- ¥ goals
- ¥ education technology and system design
- ¥ long-term strategies and timelines
- ¥ implementation plan (including district planning matrix)
- ¥ anticipated results
- ¥ monitoring and evaluation plan
- ¥ budget.

Sample tables of contents for a local education technology plan are offered in Appendix F. A copy of a sample local technology planning matrix is found in Appendix G. Districts should develop their own matrix of responsibilities and timelines for plan completion. The technology planning committee may use the sample provided as a model. A copy of the district's planning matrix should be submitted along with the local technology plan.

5.4 Local Planning Guidelines

5.4.1 Critical Success Factors for Successful Education Technology Planning

Experience and research on technology planning efforts reveal five critical factors that directly impact effective education technology planning and successful implementation of technology goals. They include:

- ¥ support of district leadership

- ¥ stakeholder involvement
- ¥ curriculum-based technology initiatives
- ¥ professional development
- ¥ identification of funding sources.

District Leadership

The school board, superintendent, key administrators, school improvement teams, and leaders of the parent and teacher associations need to be proactive in their commitment to and support of education technology infusion. With many competing priorities for limited resources in schools, top level support is critical to the successful implementation of plan goals.

Stakeholder Involvement

Planning must reflect the experience, knowledge, and perspectives of teachers, students, administrators, parents, town/city officials, and local business representatives. Everyone affected in the short and long term by the decisions made regarding education technology in schools must be involved in and/or well informed about planning activities. Most importantly, the vision of how education technology can be best used to impact education reform must be a consensus vision, fully endorsed by the implementors of the plan, and fully supported by those who influence decisions for funding the plan.

School districts should collect names of people in the community, students, teachers, and administrators who are interested in working on local plans. The planning committee will be strengthened significantly by the broadest possible representation from the community as a whole. Stakeholders will include any member of the community who has any stake in the educational welfare of that community. Examples include, but are not limited to: students, teachers, administrators, parents, business leaders, retired people, and civic leaders. Within the stakeholder groups, individuals should be selected for technology planning committee membership depending upon their support of education in the community. One good method of identifying stakeholders is to examine back issues of community newspapers. In addition, during general conversations, the names of potential candidates will arise. The technology committee chairperson will remain attuned to any possible names of people who can be added as members of the committee.

Communication is the key to managing stakeholder input. This can be accomplished well through community newsletters, meetings, local broadcast media, student input and reporting techniques, and civic club presentations. It is essential to ensure that the involvement of diverse stakeholders is recognized, celebrated, and publicized throughout the school district community while the planning activities are occurring.

Curriculum-based Technology Initiatives

The primary focus of any planning activity must remain on the individual learner and the learning process. Plans should reflect ways in which district personnel intend to undergird the entire instructional process with robust technology deployment.

Significant decisions regarding education technology goals and initiatives should be curriculum-based, since improvement in education is the primary catalyst for community support. It is difficult to engage and sustain funding support and staff enthusiasm for hardware lists with few or no clearly articulated linkages to outcomes for students.

Professional Development

A major obstacle to successful education technology planning and implementation can be the failure to consider the staff development required to integrate effectively acquired equipment and resources into

the learning process. Without sufficient professional development, education technology is too often under-utilized; it is used simply to automate older instructional methods or to deliver outmoded curriculum. Teachers and administrators must develop new skills, knowledge, and attitudes for applying information technologies in support of education reform.

Identification of Funding Resources

A local education technology plan needs to take into account different potential sources of funding that may be combined for successful implementation. The regular budget process is generally inadequate to support a major infusion of education technology within a short time frame. Business partnerships, grant opportunities, special municipal warrant articles, local foundations, and other sources need to be explored aggressively.

Thorough strategic planning establishes clear direction over a timeline that can be expanded or shortened based upon the actual funding generated. School district leadership must consider incorporating, as an annual budgetary expenditure, funds to maintain existing equipment, to update or replace obsolete equipment on a regularly scheduled basis, and to provide necessary technology support staff training.

5.4.2 Education Technology Planning Model

This section will identify and outline several key points that local school districts should consider when developing and implementing their technology planning efforts. The discussion that follows will include attention to the use of stakeholders, resources, and local support opportunities, along with the suggested components for a strong technology planning document and proposed stages to be followed by a committee during the various phases of planning.

Managing the Process

To assist local technology planners, some general suggestions are offered here for how the committee chair, working in concert with district administrators, will guide the day-to-day functioning of planning activities. These are presented in stages; however, many of these responsibilities could best be carried out simultaneously. In general, the stages of the planning process are as follows:

Stage One: Organization of Technology Planning Process

- *Form a technology planning committee* -- Ensure appropriate representation from all constituencies—all stakeholders who have a positive interest in aggressive learning and who seek to help the school. Be sure that committee members understand the planning process, that is, this may mean that the committee chair will need to provide a thorough explanation, a presentation to the committee. Assign tasks to committee members so their importance to the process will be enhanced. Form subgroups and task forces to accomplish specific goals in a timely fashion. Engage members rapidly in meaningful activity. Establish timelines, benchmarks, and goals. As timelines are reached, conduct ceremonies of celebration so members will be invigorated to move forward. Reward committee members with praise as successes are achieved. Prepare schedules of meeting times and publish that information clearly so members can arrange their personal schedules. Elect or appoint a recording secretary to keep minutes of deliberations. Some of this information may be published in the final planning document. Encourage the committee to plan with imagination, not memory. Establish working procedures and timelines for activities.
- *Gain administrative approval* -- Ensure that district administrators and school board members understand and "buy in" to the concept and practices associated with the technology planning effort. Go beyond simply informing administrators; seek and acquire their approval.

Stage Two: Preparation for Planning

- *Prepare and/or refine vision and mission statements* -- Vision and mission statements are two of the most critical parts of a written technology plan. The committee should conduct brainstorming sessions to help everyone come to general consensus on what the district considers truly important in applying technologies to learning. A vision statement should be prepared and presented to school staff and faculty personnel to gain input, understanding, and approval. Finally, a formal vision statement should be adopted by the committee for inclusion in the earliest part of the planning document. The same process should be conducted with regard to a mission statement. It is *essential* that all committee members and all school personnel understand *and can articulate clearly* the vision and mission statements to the public. This may do more to ensure successful implementation of technology than any other single activity.
- *Communicate vision and mission to stakeholders.*
- *Investigate current and emerging technologies.*
- *Identify best practices regarding education technology.*
- *Gather background information (e.g., demographic and technology-related information) about the district.*

Stage Three: Assessment of Current Status

- *Conduct a needs assessment* -- Surveys of district personnel can be quite effective in determining what people need. Poll all school personnel including bus drivers, media specialists, food service personnel, secretaries, teachers, administrators, custodians, maintenance employees, and any other pertinent people, who will interact with technologies in any way. A thorough needs assessment will be an effective tool in the hands of the technology committee that can examine the compilation of needs, interpret them , and determine what specific technologies are more appropriate in various situations. Be sure to include an assessment of support staffing capabilities and needs regarding education technology.
- *Conduct a technology inventory* -- Technologies of all types, in all kinds of learning environments, should be quantified. Count more than just computers; include televisions, VCRs, telephones, peripherals, networking components, telecommunications access, networking connections (services), etc. Consider age, maturity, and the utility of the various technologies, as well. This will give a more accurate picture of the true inventory that exists. In addition, an inventory of the human capacities (e.g., technology prowess, teacher certification levels, personal interests, and available energies) in a district is quite appropriate.
- *Conduct an analysis of facilities* -- Include current and future infrastructure capabilities and requirements.
- *Examine district/school academic and curricular strengths and weaknesses* -- Examine student performance data as well as evaluations of existing program initiatives. Determine which areas can best benefit from technology enhanced learning. Identify current district priorities and reform efforts in terms of goals in Section 7.2.
- *Review current status of professional development regarding technology skills, knowledge, and attitudes.*

Stage Four: Goal Definition

- *Review, analyze, and report data* -- When data are collected, the committee should examine the findings. A member of the committee, or a task force, should compile data in such a way that true *analysis* can occur. The committee chair should ensure that a clear, thorough report is given to the committee so all members can have a clear picture of what exists in the district prior to launching into the flurry of writing major parts of the planning document. The data should be included as an appendix to the written plan, if this is deemed appropriate by the committee.

- *Define goals based on data analysis* -- The definition of goals, preliminary strategies, and timelines for the accomplishment of goals will generally fall into six areas:
  - instructional/curricular
  - administrative
  - professional development
  - communication and information access
  - staffing
  - maintenance/upgrades.

Stage Five: Development of the Implementation Plan

- *Develop strategies and timelines for implementation* -- This is the stage in which the action plan is developed. The technology committee should give careful attention to developing realistic strategies and timelines for attainment of goals.
- *Determine priorities and anticipated results* -- The limited Technology Enhancement Act funds cannot pay for all of a district's needs. The technology committee must analyze existing resources, including but not limited to the Technology Enhancement Act funds, and determine priorities. In addition, the district needs to identify in performance terms the anticipated implementation plan results.
- *Determine costs and prepare budget* -- Based on strategies, timelines, and priorities selected, develop budget information for the technology plan. The budget can reflect other costs that may require other sources of revenue (e.g., grants, Goals 2000, Eisenhower).
- *Begin preparation of document* -- At this stage, if it has not already begun, document preparation should begin. The committee chair should subdivide the tasks so that a maximum number of people are able to work simultaneously to compile the most meaningful document possible. Periodic meetings should be held among subcommittees to help ensure continuity and articulation of components of the plan. When the first rough draft is finalized, the committee should distribute it to teachers and other pertinent district personnel to gain feedback. This "back and forth" process can occur as many times as is necessary in order to yield a maximally effective plan. To aid planners, a listing of suggested components in a planning document is given in the Appendix F. For additional information and/or clarification of any individual parts of a plan, planners may contact either the MDE Office of Educational Technology or the National Center for Technology Planning (NCTP).
- *Mount a public relations campaign* -- As the planning document is nearing completion, the planning committee should marshal the creative energies of various community leaders who can portray to the community at large the many benefits that will accrue from an aggressive technology infusion program. The committee should arrange for speeches and presentations before local civic groups, social clubs, church organizations, as well as in informal settings. All materials should have a high degree of visual appeal. This is an opportunity for the planning committee to capture the spirit of the community and to capitalize on the myriad of talents that people representing a broad spectrum of the community will donate to this activity.

Stage Six: Monitoring and Evaluation

- *Establish monitoring and evaluation of plan* -- The technology planning committee should determine the process and timeline for evaluating the success of the strategies implemented in the plan. In addition, the committee should develop a schedule to provide for periodic monitoring of the plan's timeline, implementation schedule, etc. The committee should maintain records that will help give a clear picture of what transpires. Evaluation of the technologies, the process, the implementation, and user feedback should take place perpetually, not just after implementation has begun. A special task force on evaluation should be formed so that the data which are captured will be analyzed and applied to improvement. Results of evaluation should be fed back into the process so benefits can be recognized immediately.

- *Establish a revision schedule* -- Plans should be reviewed by the technology committee and updated on a periodic basis (at least annually) based on the timeline in the evaluation plan.

5.4.3 Education Technology Planning Team Review

Before a district technology plan is submitted to a local school board, it is important to conduct an internal audit and review of the plan. The education technology planning team should thoroughly review the planning process and the desired learning outcomes. When that process is complete, another group of district-level stakeholders, typically the curriculum improvement or professional development committee, should review the education technology plan for overall quality assurance.

The next step is to present the technology plan to the district superintendent so that the key educational leader in the district can address any issues or questions before submitting the completed plan to the school board for review and approval. The primary criterion for quality assurance is how well the completed technology plan addresses school and curriculum improvement objectives.

5.4.4 Local School Board Review

Acquire school board approval. A technology plan must be approved by the local school board. Technology planning committee members, along with supporters from the community, should prepare a compelling presentation that will show the board how infusion of technologies into instruction will strengthen the intellectual life of students and will have the potential to enhance the economic climate. School board's approval is critical because the board represents the community's interests and controls the local budget. The board's acceptance of the education technology plan represents the community's support and the board's approval for formal adoption of the plan. If board members were enlisted as key stakeholders during initial planning activities and periodically informed throughout the education technology planning process, then the formal school board review should not represent an obstacle for approval.

However, if the local school board was excluded from planning activities, then support for the vision, goals, recommendations, and implementation strategies for the integration of technology into students' education may be lacking.

Upon approval of the local school board, the plan may be submitted to the Mississippi Department of Education Office of Educational Technology for approval. See Figure 5-1 for approval process flow chart.

5.4.5 Implement the Plan

When the plan is approved, implementation may begin according to the timeline in the local technology plan. Strict records should be kept during initial phases of implementation so "fine-tuning" can occur. The implementation phase is one that may be replete with anticipation and excitement. A strong *support* system will need to be established early in the implementation phase.

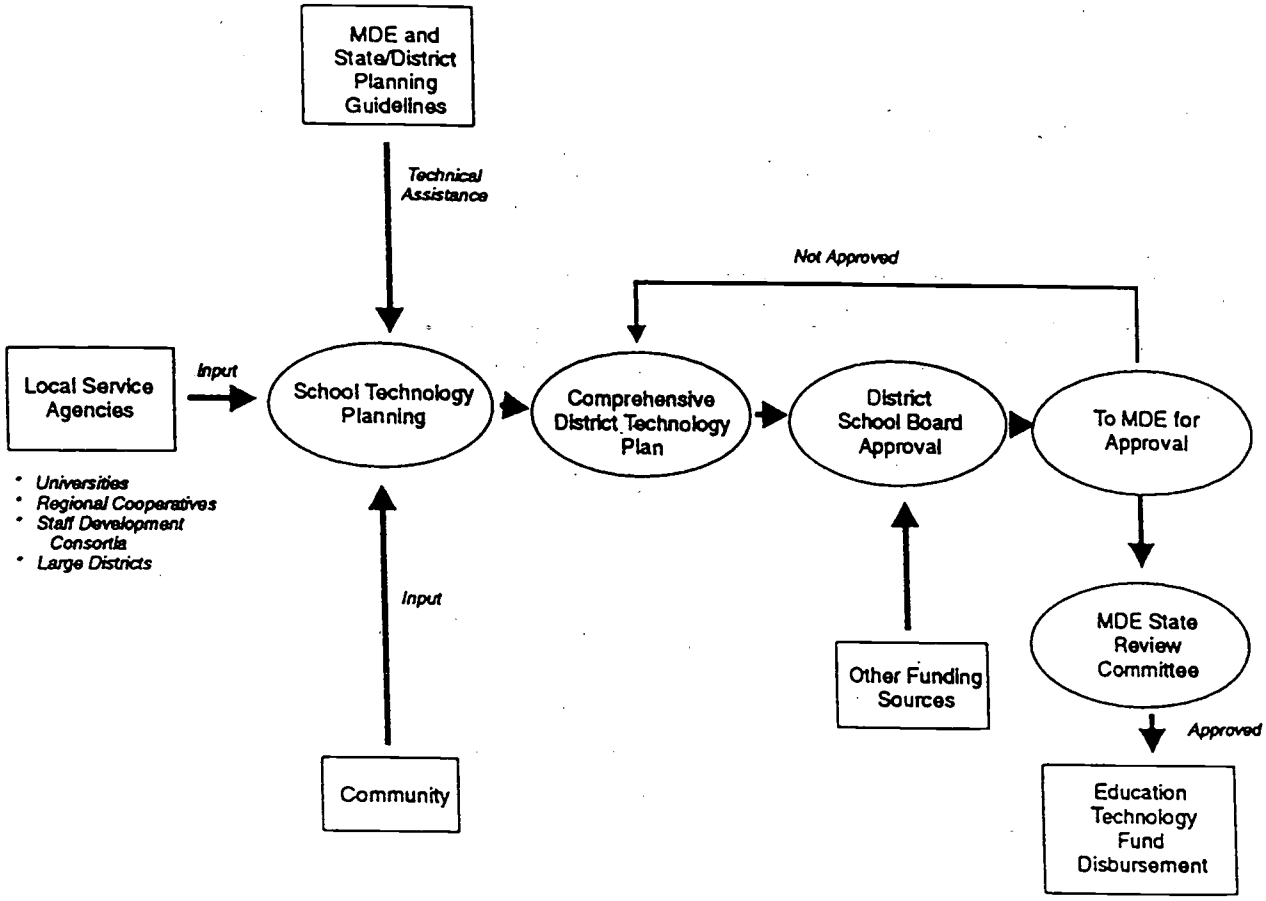
The implementation process is cyclical in nature, not linear. Some activities will be occurring simultaneously. The committee chair, then, is well advised to use some type of project management software (or flow charts drawn on paper, at least) to structure the entire process. Management of the varied activities will be much easier when a pictorial view can be acquired. Committee members will have a clearer understanding of how they are progressing toward deadlines and the extent to which responsibilities are divided among the groups. If the planning process is managed appropriately, there will be a greater propensity for success when technologies are infused into the learning and education environments.

Accessing Technology Planning Support

A wide range of support should be made available to technology planning committees and interested educators. A clearinghouse of printed and electronic materials that focus upon the planning processes, education reform, systemic change, and existing and emerging technologies will be developed and monitored by the Department of Education and technical assistance contacts. Districts and schools should be provided with electronic access to support materials and information that planning teams find valuable in conducting planning process meetings . Once access is provided, individual districts and schools may analyze and communicate which information that best supports the development of their comprehensive plan.

Districts can find numerous resources to aid them in developing the various components of their technology plans. Perhaps one of the most beneficial resources to Mississippi educators is the National Center for Technology Planning (NCTP). NCTP offers a plethora of materials that can be employed throughout the planning process; these have been garnered from hundreds of schools around the world. A recently developed aid created at NCTP is the *Guidebook for Developing Effective Technology Plans.* This booklet is available for accessing and downloading via the World Wide Web on the Internet. Numerous articles on technology planning written by Dr. Larry Anderson are available for distribution to schools, as well. Sample technology plans from schools around the United States are available through the NCTP.

Figure 5-1 Approval Process Flow



6. FUNDING ISSUES AND STRATEGIES

This plan provides several approaches to the allocation of Technology Enhancement funds to local districts. Each addresses the intent of the authorizing legislation. All funding allocations will occur after the local technology plans are approved by the State Board of Education.

Funding allocation options:

A. Provide direct funding to the school district based on average daily attendance (ADA). Each district's enrollment will be aggregated at the state level and dissemination of the funds will be based on the average of the district's second and third month attendance data.

B. Ensure that all districts receive a minimum level of technology funds by establishing an equal base amount for each district. The balance of funds would be allocated based on ADA.

C. Provide an equal amount of funding to each district for technology-related activities. These funds either may be expended at local discretion, categorically for required initiatives, or some combination of the two.

D. Provide funds for area and regional communication hubs to minimize communication line charges to local districts. The balance of funds will be allocated based on ADA (see below).

E. Allocate funding according to a formula that combines ADA and equity funding.

A major concern that must be taken into consideration is equity of opportunity among all Mississippi districts and schools. Care must be taken not to penalize progressive districts and schools that have opted to invest local funding and efforts in technology integration in their schools. At the same time, consideration should be given to those districts and schools that have not had the opportunity to move forward in this area. To strike a balance between the two groups, allocation of Technology Enhancement Act funds will provide a minimum level of technology-related services to the schools and districts, and lend support for statewide network access. Districts will establish their own priorities through local planning for expenditure of funds from the Technology Enhancement Act. **The Council for Education Technology recommends that the Board of Education adopt funding allocation option D. Detailed information of Option D is provided below:**

Sample Funding Allocation-Option D

Funds available through Technology Enhancement Act funding	$30,124,728
Funds allocated by 1995 Legislature for teacher technology training	$ 899,820
Funds to be distributed to districts upon receipt of acceptable plan (based on $57/ADA, FY95 ADA = 470,974)	*$26,845,518
Funds for area and regional communication hubs to minimize communication costs to districts	$2,020,000
Funds for contingencies in developing service to schools	$359,390

*Planning/management mini-grants have been awarded to 103 districts totaling $153,253. For districts who have received mini grants, the amount of the mini grant will be deducted from the total distributed to them from the Technology Enhancement Act funds.

6.1 Design Principles

School districts must focus funding priorities based on areas of weakness identified in the needs assessment stage of the planning process conducted within the district. The Technology Enhancement

Act funds should be utilized to address these weaknesses either on a district-wide level or for a specific school, grade level, or subject area (i.e., if district test scores reflect lower scores in reading, then Technology Enhancement Act funds should be allocated toward the improvement of reading). Consideration should also be given to the prioritized sequence of goals and implementation strategies found in Section 7.2. Additional funds could be distributed based on other local school or district priorities, such as the elementary school, the classroom, and/or the library/media center. This allows for direct input from teaching staff and parents in determining school or district-wide priorities. Consideration should be given to eliminating gaps within the districts in regard to access to technology and the district's distance learning needs.

If a district does not have sufficient resources to pilot a special project or adequately address needs, participation in a consortium of districts is encouraged. Districts may consider a project that would mutually benefit all partners in the consortium. If a consortium is considered, one district must be selected as the fiscal agent for the consortium. All funds and communication regarding the project will be conducted with the fiscal agent district.

6.2 Determining System Costs

The following table provides projected costs for a sample networking technology initiative for an elementary school of 500 students:

Table 6-1: Sample of Projected Costs for Technology Initiatives

Category of Expense	School
Software (includes instructional and productivity software applications)	$22,500
Hardware (includes approximately 20 student/teacher workstations [desktops and laptops] with a corresponding number of printers, projection screens and multimedia capabilities)	$45,000
Network (includes the wiring, file servers, and communication equipment/software for current workstations; peripherals; external telecommunications capabilities)	$48,750
Staff Support NOTE: Although this is a critical domain, local, other state or federal dollars should be utilized for employment of personnel	**$35,000
Training (based on minimum of 20% of the total technology initiative cost)	$23,550
Supplies (includes paper, instructional supplies, diskettes, mouse pads)	**$4,500
Maintenance	**$1,000
Planning/Management ($1,500 was allowable district-wide through the mini-grant process)	$1,500
TOTAL	**$181,800**
From Tech Enhancement Act Funds	**$141,300**
From local district funds or other sources	**$ 40,500**

** Not available through Technology Enhancement Act funds.

Table 6-2: Sample of Projected Costs for Distance Learning Electronic Classrooms

The following table provides a sample of projected costs for technology initiatives involving an electronic classroom for distance learning and other technology based instruction.

Audio and video equipment, cables, software, training, renovations	$95,000

It is anticipated that each school district would need at least one electronic classroom for the near future with additional classrooms being installed as needs demand.

Table 6-3: Sample of Projected Costs for Communication Hub Sites

Ongoing costs of communication lines and systems can be prohibitive if districts are responsible for covering the costs for e-mail, Internet, or other network systems. To minimize communication line costs to the districts, area and regional communication hub sites will be placed in different geographical areas in Mississippi. Area sites, designed to provide network service to schools and districts, will minimize communication costs. Regional communication hub sites will be placed in close proximity to BellSouth communication hubs.

Estimated costs of area communication hub sites (network, routers, switches, etc.) 33 sites @ $40,000	$1,320,000
Estimated costs of regional communication hub sites 10 sites @ $70,000	$700,000

6.3 *Sustainability and Future Needs*

Technology is and will continue to be integral to education. No student in Mississippi should be denied the opportunity to participate in a technology-rich environment. To inadvertently limit access to technology will seriously undermine the principles and purposes of public education. Mississippi leaders must be careful to ensure that the educational environment is not populated by 'haves' and 'have nots', or 'users' and 'non-users'.

A critical issue related to funding is sustainability. The technology infused into the classroom requires ongoing funding support. Currently, no consistent procedures or sources exist to support education technology in Mississippi's schools. Few districts have the resources to direct local funds for ongoing support needs. The Mississippi Department of Education must offer leadership and support to ensure that technology and related applications in education will be distributed and sustained equitably and sufficiently throughout the state.

Several key areas in the acquisition, implementation and maintenance of education technology must be addressed at both the local and state level including:

- ¥ acquisition of appropriate equipment and associated infrastructure (e.g., LANs, wiring, building accommodations)
- ¥ training for faculty, staff, students and community
- ¥ continuing costs, such as telecommunications and maintenance
- ¥ technical and application support

- ¥ timely upgrade and/or replacement of equipment
- ¥ additional staffing positions to support education technology.

There are a number of current alternative funding sources available for these needs. They include:

- ¥ Technology Enhancement Act (Senate Bill 3350) (provides an immediate $30 million for technology in the classroom). In addition, $60 million is available through selling bonds. (However, bonding funds may not be appropriate for the purchase of equipment with a life expectancy shorter than the time required to repay the bonds.)
- ¥ Minimum Program Foundation funds (provides base level support for education in the districts).
- ¥ Title I and Title VI funds
- ¥ Eisenhower funds
- ¥ federal grants including National Science Foundation, Star School Grants, and Goals 2000
- ¥ special education funds
- ¥ instructional program providers

It is anticipated, however, that some of the education technology cost categories are currently unfunded or underfunded through these sources. Local education agencies must determine what part of their technology plans fall into unfunded or underfunded areas.

The acquisition and implementation of education technology within the K-12 community will have ramifications in other parts of the education community. The education partners of K-12 should become involved in the support and implementation of education technology in the K-12 schools. These partners will have needs that must be funded if the state as a whole is to move forward in its plans for wide-spread use of technology. Accordingly, the following must be addressed:

- ¥ Telecommunication infrastructure must be developed that provides sufficient bandwidth and connectivity for schools, community and junior colleges, libraries, education television services and universities. This infrastructure is a network of networks with all partners working in concert to allow for interoperability, sustainability, and access.
- ¥ University pre-service programs in education must model the use of education technology.
- ¥ Technology infusion must begin at the preservice level to ensure that all teachers are prepared for the classroom of the 21st Century.
- ¥ Distance learning programs require support for existing and new technology.
- ¥ State libraries require technology to support students outside the school building in distance learning and in resource sharing capabilities.
- ¥ Regional demonstration and/or training centers are required for training and support.
- ¥ Community and junior colleges require expanded distance learning capabilities and resources for sharing and training.

The funds provided by the Technology Enhancement Act provide significant capability to districts to begin their technology development. However, it can be seen that further funding must become available to continue providing students and teachers the technology and support required to prepare Mississippi students for the 21st Century workplace. These and additional financial areas must be addressed by local district boards and the MS Legislature to ensure current investments in education technology are not diminished due to lack of future support and expansion.

7. IMPLEMENTATION STAGING/PHASING

The implementation of a comprehensive state technology plan must be accomplished incrementally. The Mississippi Council for Education Technology believes that education technology can enable Mississippi educators to transform the classroom of the future into one where teachers and students are partners actively engaged in learning.

7.1 Requirements for Local Planning

Local districts are required to submit a local technology plan in order to be eligible for Technology Enhancement funds. Although it is recommended that local schools develop technology plans, only submission and approval of the **district** plan is required. Plan timelines may span no less than three or more than five years. Detailed local technology plan guidelines will be distributed by the Office of Educational Technology (OET) to district technology contacts in a separate document by November 1, 1995. Local technology plans may be submitted to the Office of Educational Technology anytime after November 15, 1995 for Technology Enhancement funding. Districts unable to comply with these guidelines should contact the OET for assistance.

Local technology plans submitted to the Office of Educational Technology will be reviewed by a team of the MDE and outside consultants using the pre-established criteria set forth in the guidelines document. Plans must be comprehensive. They should include all activities that relate to the integration of technology into the district, not just those that can be funded by the Technology Enhancement Act funds. Once approved by the review team, the recommendation for funding must be approved by the State Board of Education. Once approved by the State Board of Education, the district will be notified and the funding allocation will be made to the district.

If a district plan does not meet all of the criteria, the district technology coordinator will be instructed as to the corrective action(s) that should be taken.

7.2 Timelines for Education Technology Implementation in Schools and Districts

Mississippi districts and schools are in different stages of technology integration. An infusion of technology across the district is necessary if the nature of teaching and learning is to change. However, although the plan should address comprehensive technology needs, Technology Enhancement fund expenditures will not meet all current and future needs. Therefore, it is recommended that districts analyze their immediate and long-range needs and identify funding sources other than Technology Enhancement Act funds to satisfy identified needs.

The following goals have been identified in SB3350 and are to be used as a guide for the development of the local technology plans by the district technology committee. The use of these implementation strategies are suggested, not required.

GOAL 1: *To provide access to individualized instruction through computer-based technology, video and other technology-based instruction.*

STRATEGY: **Focus on classroom infusion.**

- ¥ Provide a *multimedia workstation for every teacher
- ¥ Establish an electronic classroom

*see Appendix D for more specific information

- ¥ Establish a ratio of one workstation to every five students

***GOAL 2**: To improve teaching and learning and the ability to meet individual students' needs to increase student achievement.*

STRATEGY: **Focus on curriculum integration.**

- ¥ Infuse technology competencies throughout curriculum.
- ¥ Identify areas of academic weakness/need and use of technology to meet that need.
- ¥ Incorporate Internet access and multimedia research capabilities in the media center.

***GOAL 3:** To improve curriculum delivery to help meet the needs for educational equity across the state.*

STRATEGY: **Focus on connectivity.**

- ¥ Install a local-area network within the school and wide-area network connected to other schools/districts/agencies/Internet.
- ¥ Upgrade libraries to technology media centers for automated media circulation/cataloging, and telecomputing to library/information sources, or other online services.

***GOAL 4:** To improve delivery of professional development.*

STRATEGY: **Focus on professional development.**

- ¥ Provide professional development on technology for all professional staff and school board members. (20% of funds spent on professional development)
- ¥ Provide technology support program for staff.

***GOAL 5**: To improve the efficiency and productivity of administrators.*

STRATEGY: **Focus on reporting and accountability.**

- ¥ Implement student level database program in each school.
- ¥ Continue implementation of MONEX.

***GOAL 6**: To encourage development by the private sector and acquisition by districts of technologies and applications appropriate for education.*

STRATEGY: **Focus on emerging technologies**.

- ¥ Develop software and hardware applications that enhance educational curricula.
- ¥ Develop partnerships with the private sector to accomplish this goal.

***GOAL 7:** To ensure efficient and equitable use of technology at all levels from kindergarten through higher education, including vocational and adult education.*

STRATEGY: **Focus on maximization of investment**.

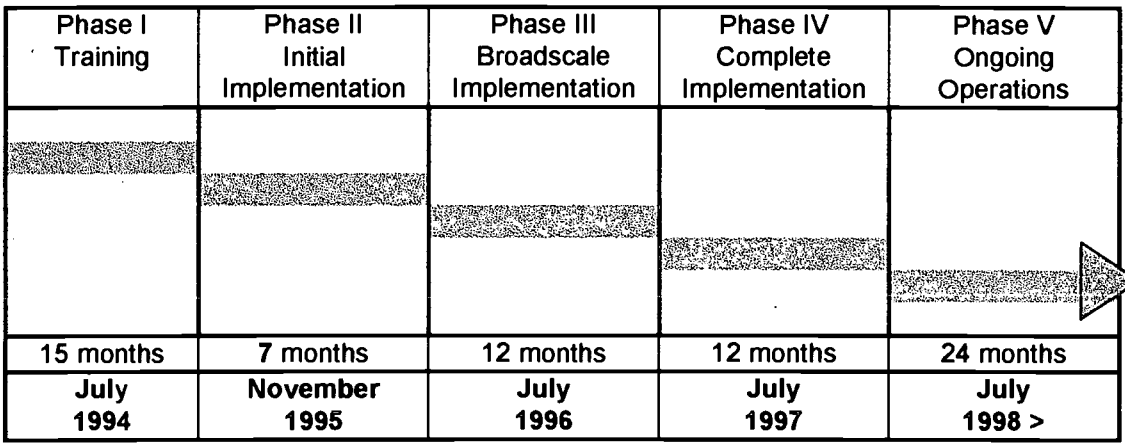
- ¥ Identify funds to be used to match with all other initiatives.
- ¥ Provide assistance for development of local planning efforts.
- ¥ Utilize standards to maximize investments.

7.3 Long-range Planning and Updates

The following table represents the schedule for long-range planning and plan updates at the state and local level.

Table 7-1: Schedule for Long-range Planning and Updates

Phase I July 94-October 95 Planning	Phase 2 November 95-June 96 Initial Implementation	Phase 3 July 96-June 97 Broad Implementation	Phase 4 July 97-June 99 Complete Implementation
The Council of Education Technology is appointed.	Local district technology plans are developed.	Implementation of approved local district plans continues for year 2.	Implementation of approved plans continues for years 3-4.
The Office of Educational Technology is established.	Approved local plans are implemented for year 1.	Local districts begin update of technology plan.	Distribution of bond money begins as plans are updated in July, 1998, based on revised *Master Plan*.
Mississippi Master Plan for Education Technology is developed	Distribution of Technology Enhancement funds.	*Master Plan* is revised and updated.	Internet is expanded to all 153 school districts.
	Internet pilot begins in 15 districts.	Monitoring of plan implementation begins.	Updated technology plans are submitted for funding with bond funds.
		Internet is expanded to 80 districts.	



7.4 Reporting and Evaluation

Local technology plans must include a schedule of yearly evaluations of accomplishments and activities described in the plan to help monitor successes, and possible failures. The effectiveness of the

technology plan increases as evaluation is made an integral part of planned activities. Reporting and evaluation strategies should include the following:

- ¥ Establish evaluation criteria before evaluating the plan.
- ¥ Review goals and objectives to determine if changes are necessary and how they can be made.
- ¥ Use a system for data and information collection.
- ¥ Ask an independent third party to assist in evaluating the plan.
- ¥ Learn under what conditions various technologies work best.

7.5 Public Information Strategy

In order to ensure a focused vision and effective plan implementation, a comprehensive public information strategy must be developed. In order for the plan to be supported, plan content and strategies must be understood and communicated to all Mississippi citizens. The strategies will be developed by the Council for Education Technology and the Project Advisory Committee representatives in cooperation with Office of Educational Technology. Public information strategies will address multiple audiences through a variety of media. A myriad of topics will be covered including plan content, support structures, processes for local district planning, training opportunities, impact on citizenry, policy and procedures for implementation, and awareness of emerging technologies.

Implementation Strategies

- ¥ Hold a Vendors Fair for citizens annually beginning March, 1996, to showcase emerging technologies.
- ¥ Conduct public awareness sessions over CCN, Fibernet 2000, and ETV.
- ¥ Present information at state conferences and through seminars in local districts.

8. BENEFITS AND POTENTIAL OUTCOMES OF THE TECHNOLOGY PLAN

Successful creation, adoption, and implementation of the *Mississippi Master Plan for Education Technology* will yield many benefits to the citizens of Mississippi. Thousands of people will have to work diligently and collaboratively if the dream specified in the vision statement is to be realized. It is anticipated that numerous examples of accomplishments will exist within the first year of implementation.

The successes that will be realized as a result of systematic adoption of instructional technology into the educational process can be shared among a vast array of partners. Further, as evaluative data from initial implementation phases are gathered, successful strategies will be further strengthened. This will enable Mississippi youth to benefit from a healthier learning environment.

8.1 Improved Teaching

Technology will ***never*** replace teachers. Technology may, though, serve a pivotal role in *dis*placing ineffective, unwilling teachers. When coupled with appropriate peripheral equipment and excellent software, technology will assist teachers in many ways that are not imagined currently. All Mississippi educators must stay alert, though, to ensure that teaching is conducted properly.

Educators are familiar with the adage that teachers must become *the guide by the side* rather than remaining in the traditional role as *the sage on the stage*. The most effective teachers are comfortable with this philosophy. When technology is incorporated into the process as a natural partner, the effectuation of the adage becomes much simpler. Technological accessories have the potential of being used to free teachers to think about issues associated with learning that time did not allow previously.

The United States Department of Education released an informative report, *Prisoners of Time*, that reminded us of the many ways that teachers' time is encroached upon by trivialities and minutia. Demands of the fast-paced society drain teachers' energies during extra-school activities. The advent of new, fast, powerful technologies loose the fetters that have bound teachers and administrators for too long to tasks that consumed time in huge chunks. It has been said that, "Teaching will become better when we make it easier." Technology certainly has the potential to make some parts of teaching easier; however, the extra-creative teachers will not succumb to ease. Rather, they will fill the new-found time with learning activities that challenge their students to attain new vistas of achievement.

8.2 Enhanced Learning

Learning, bolstered by technologies, cannot be limited by the walls of classrooms. While increased use of technology will not drive learning from the classrooms, expectations include witnessing a renewed love for learning by youth and adults alike.

Technology-coupled education will reveal learners who are engaged, in the truest sense of the word. One benefit of finding computers in learning environments will be that students of all ages, races, and socioeconomic demographics are able to realize satisfaction in the challenges of discovering new, constantly changing information. Learners will be creators of their own wisdom—this is not an insignificant phenomenon.

Technologies will *challenge* learners. No longer will students have to succumb to knowledge-level, cognitive domain information. They can be challenged to strive for increasingly higher and more intellectually invigorating realms of learning.

Learners will enjoy the benefits of new sources of knowledge—and more of them. The information explosion will reveal a much greater quantity of materials that are readily accessible to ordinary individuals. Further, these same individuals will be able to *contribute* to the body of knowledge.

Not only will the quantity of terrific learning and information resources increase, but the access to such materials will become greater. Citizens of Mississippi stand at the precipice of an increase in the number of access points as well as an increase in the bandwidth of the "pipes" that constitute the infrastructure. This scenario will allow significantly higher quantities of data to flow at a much higher rate, thereby helping people become *accustomed* to "just in time" learning. When learners who traditionally have been deprived of this intellectual playground suddenly have access to an unimaginably rich world of material, Mississippi will witness a potential explosion in the development of human capital. This scenario represents a clarion call to educational leaders in Mississippi to "make it so."

Enhanced learning conditions, bolstered by technological advances, will enable the creation of online collaborations. Virtual communities of learners will be created where socioeconomic, geopolitical boundaries dissipate. People will become empowered to form teams and develop relationships on-line, and using technologies, to attack problems and propagate solutions. The numerous positive benefits of such poly-dimensional bonding cannot be predicted accurately; human interactions will seed the potential.

Perhaps the most positive benefit will be subtle. With the advent of technologies into instruction at all levels, students will have time to think! If an environment is carefully crafted that encourages the wise thrift of time and other precious resources, we will realize a savings in time that can be used to free students to ponder, reflect, make conjectures, and predict.

8.3 Facilitation of Management

The full, appropriate integration of technologies into school environments will allow the management of resources to become significantly easier. When managers have ready access to a plethora of up-to-date data and information, they can make decisions that impact operations almost instantly. When this scenario is realized, educators in classrooms and school offices will be much better served.

Databases and other open-architecture applications can be used to streamline auditing capability. Technology leaders will have a handle on what is happening, actually, in their system. Possessing and being able to use information of this nature will facilitate the wisdom that is essential as Mississippi witnesses a virtual explosion of technology-related activities reaching classrooms and learning environments of this state.

8.3.1 Decision Support

Better, higher quality *data* that become *information* through effective use should result in better decisions. A supremely-important component of the technology-rich community being constructed is the support mechanism for ensuring extremely high-quality decisions.

Students should be invited to become involved in the decision-making process in the development of a revolutionized, technology-enhanced educational system deployed throughout the state of Mississippi. Students have an acute ability to wrench the truth of a situation from the labyrinth of mere facts, often. They will assist in establishing frameworks where the decisions can be reached quickly and efficiently and where the decisions that are made can enjoy sustainability through their life of effectiveness.

Students should be encouraged to engage in simulations that may help demonstrate the positive aspects of various decisions being considered. This scenario represents a significant benefit to the decision support system that must be ongoing in the state.

Organizational structures have become flatter during recent history, as a result of such movements as the Total Quality Management (TQM) philosophy. Increasingly, important decisions are being made at lower levels in organizations. As students and teachers are empowered to make decisions—and to be a part of decision support structures— a spirit of unity will emerge that complements the improvements in management operations significantly.

8.3.2 Organizational Efficiency

Technology planners anticipate recognizing multiple manifestations of ways that organizational operations become more efficient. Potential benefits that can be expected from a technology infusion program will include streamlined purchasing procedures. Mississippi schools, at all levels, should find it easier to purchase new equipment, new software, updates to equipment, peripherals, and services in a manner that is streamlined greatly. Districts will want to find individual pieces of technology, as well as bundles, that they can purchase "hassle-free." They will want to be sure that some system exists where the products available for purchase are being tested within the state and that reliable, timely information can be acquired so they will be able to avoid costly wastes of money.

The proliferation of multiple data sets that support management decisions will make it possible for many Mississippians to participate in the ongoing propagation of increased effectiveness. With the onslaught of this increased scrutiny by vast numbers of citizens, it is expected that the efficiency of management operations will improve. Though the potential benefits of these arrangements cannot be predicted accurately; these benefits will be substantive. One potential outcome is that some of Mississippi's youth who participate in this new scenario of collaborative decision-making will be prepared to enter professional fields within the state. They will not have to leave Mississippi to seek greater fortunes elsewhere, partially because they may feel like they have made such a significant contribution here. Too, Mississippi will reap a great economic benefit because the vested resources it has poured into these young lives will be retained in the state. Technologies deployed appropriately through Mississippi schools will be the strong vehicle for this kind of change in the state.

8.4 Enhanced Communication

Advanced technologies deployed throughout Mississippi, using a robust infrastructure capable of carrying great quantities of voice, video, and data simultaneously, will enable Mississippi citizens to communicate in a much more natural mode than can be experienced presently. A major potential benefit will be that greater *quantity* of information transmitted may result in, or lead to, greater *quality* of information. Technology futurists can predict that, if an infrastructure capable of handling extremely high rates of transfer is put in place, sufficient time will be saved that will allow and encourage people to develop stronger management strategies.

8.5 Improved Community Development

Certainly, community development activities will become enhanced as a result of infusing technologies into instruction at all levels. The word "community" has taken on new meaning during recent years, as people who are using telecommunications technologies are empowered to meet and work collaboratively, with total disregard to distance and time. The economic impact will be great as learners at all levels will be interacting to discover new ways that their communities can be bolstered.

Numerous state-level and local government offices should be prepared to work closely with Mississippians who are using the telecommunications network as a virtual "town hall." A strong increase in this type activity will enable more people to have direct involvement in day-to-day strengthening of the state through development opportunities. A brain trust will be developed on-line so that new solutions to persistent problems, along with fresh directions for now and the future, can be crafted quickly.

Appendix A

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Introduction

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Kenneth Pennington	Education Grants Consultant	Office of Special Education, MDE

Appendix B

Telecommunications Committees

TELECOMMUNICATIONS CONCEPT COMMITTEE

Olon Ray, Chairperson	State Board for Community and Junior Colleges
Marie Antoon	Institutions of Higher Learning
David Litchliter	Information Technology Services
Mary Ellen Pellington	MS Library Commission
Helen Soule'	MS Department of Education
Larry Miller	Ms Authority for Educational Television

COMMON NEEDS COMMITTEE

Dan Brook, Chairperson	MS State University
Pat Beard	MS Library Commission
Larry Day	State Board for Community and Junior Colleges
Judy Jasper	MS Authority for Educational Television
Julie Jordan	MS School for Math and Science
James Williams	Northeast MS Community College

TECHNICAL SPECIFICATIONS/OPERATIONS CAPACITY COMMITTEE

Martin Mangold, Chairperson	MS Authority for Educational Television
Roger Graves	Information Technology Services
Kris Gautier	MS Department of Education
Mike Rackley	MS State University
Nathan Slater	MS Department of Education
Ray Smith	State Board for Community and Junior Colleges
Alan Withoff	MS Library Commission
Robert Smith	MS GulfCoast Community College

TECHNOLOGY/VENDOR'S FAIR COMMITTEE

Gus Bowering, Co-Chairperson	MS Department of Education
Roger Graves, Co-Chairperson	Information Technology Services
Lisa Jackson	MS Library Commission
Jeff Judin	MS Authority for Educational Television
Ray Smith	State Board for Community and Junior Colleges
Thomas Fortenberry	East Central Community College
Susan Davis	MS Department of Education
Karen Newman	Information Technology Services

Appendix C

Graphs of Key Findings

Figure 1: Student and Teacher Use of Technology Devices

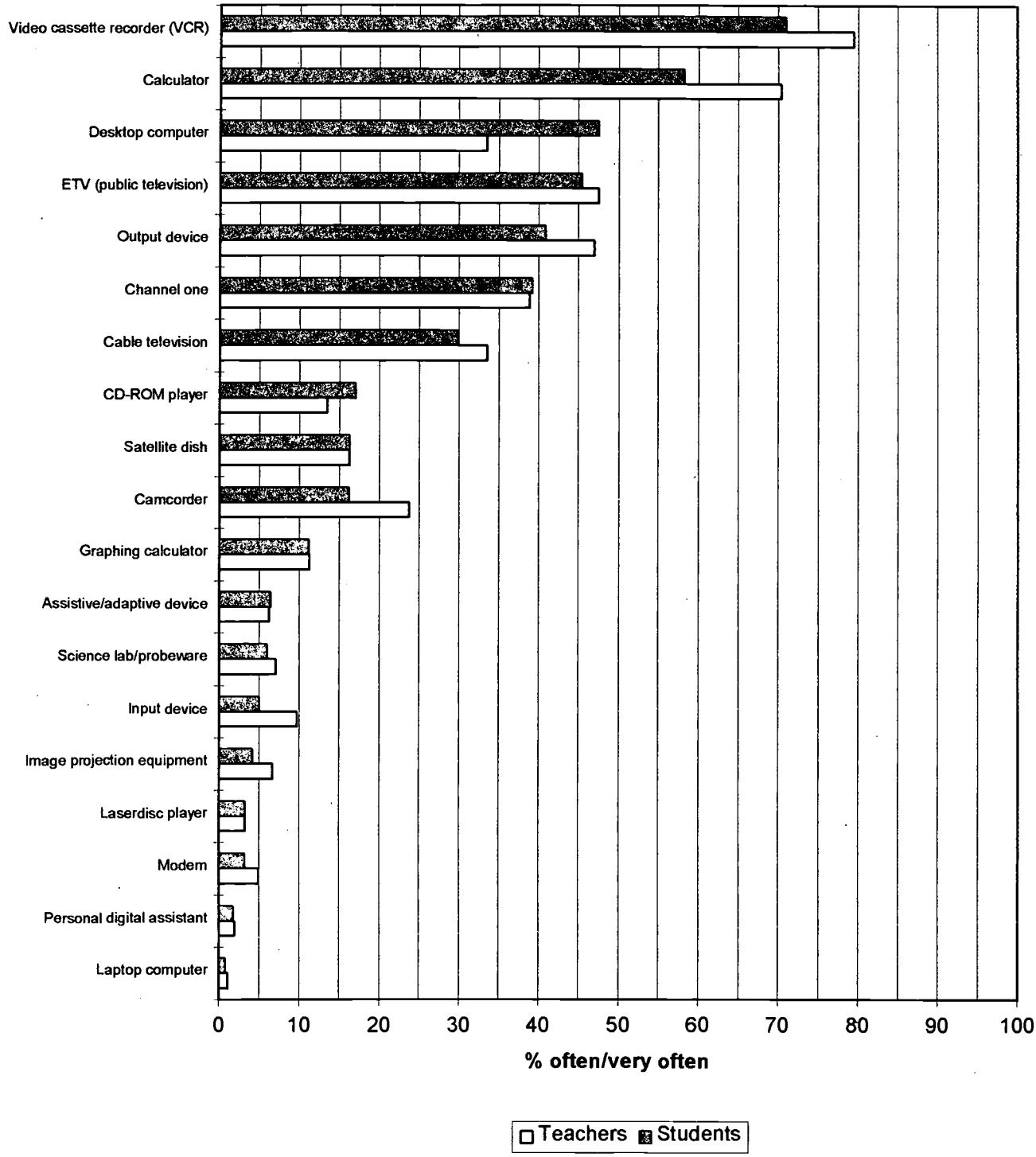


Figure 2: Student and Teacher Use of Technology in Subject Areas

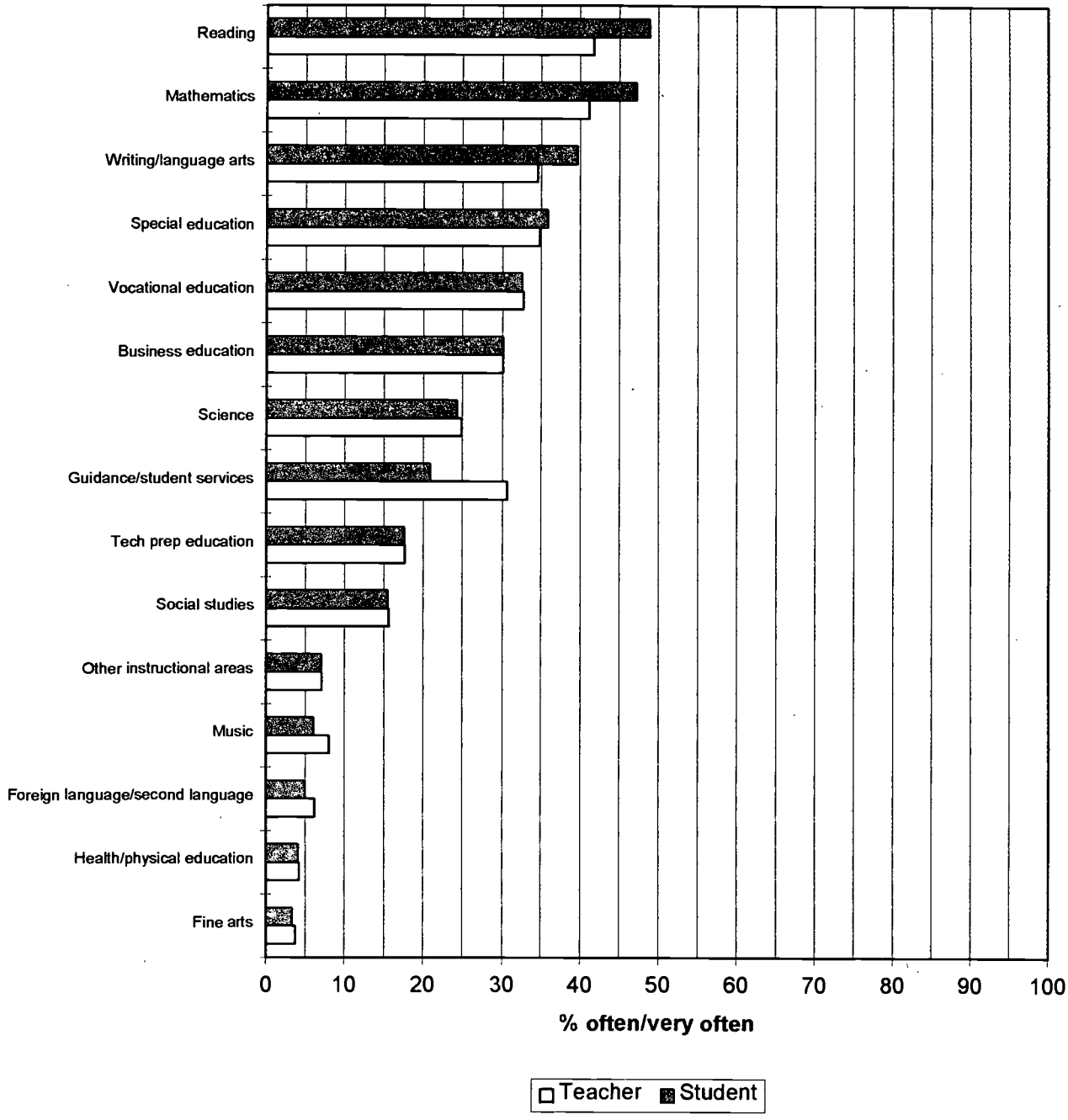


Figure 3: Technology Service Needs

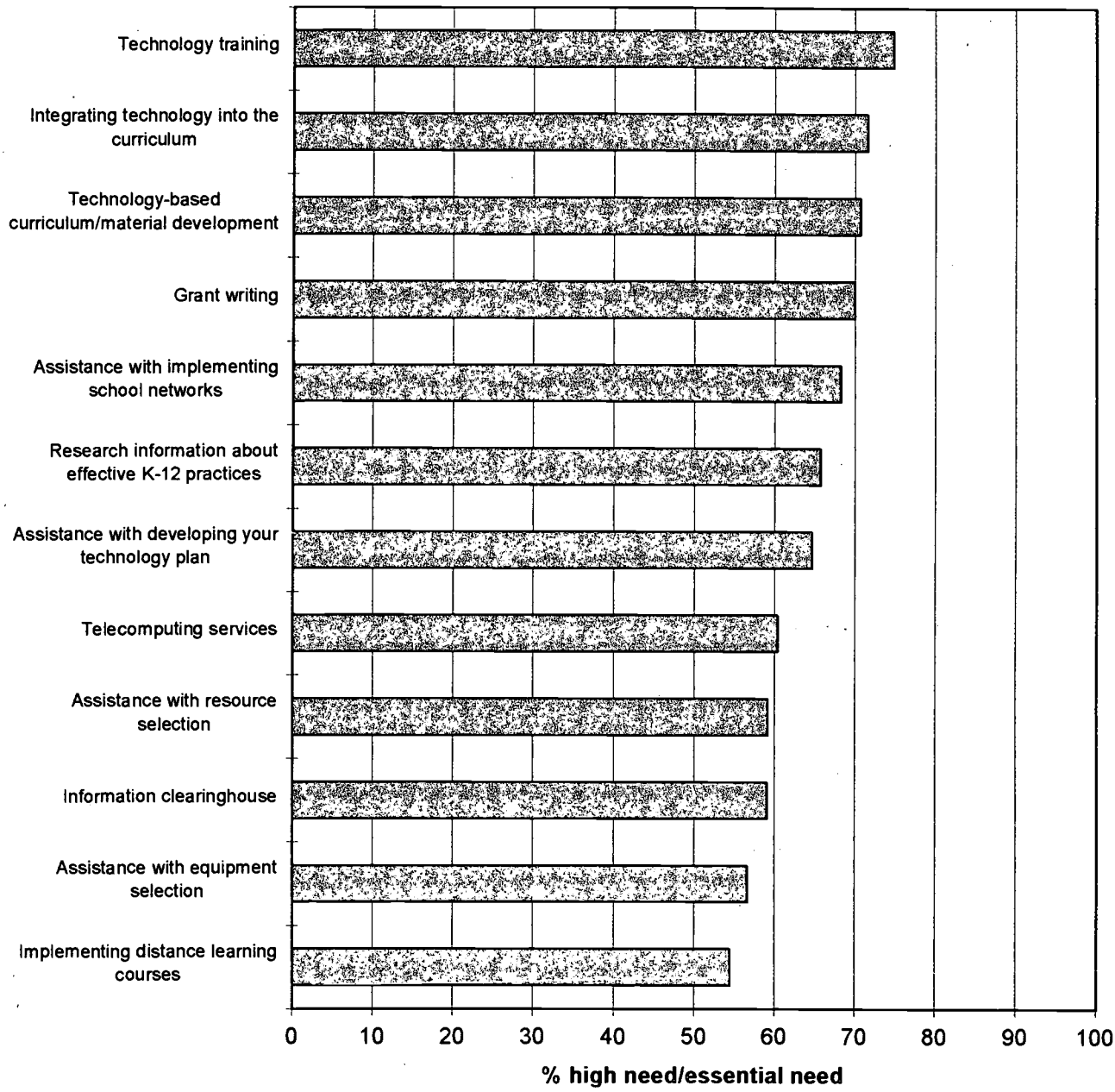


Figure 4: School Use of Other Technologies

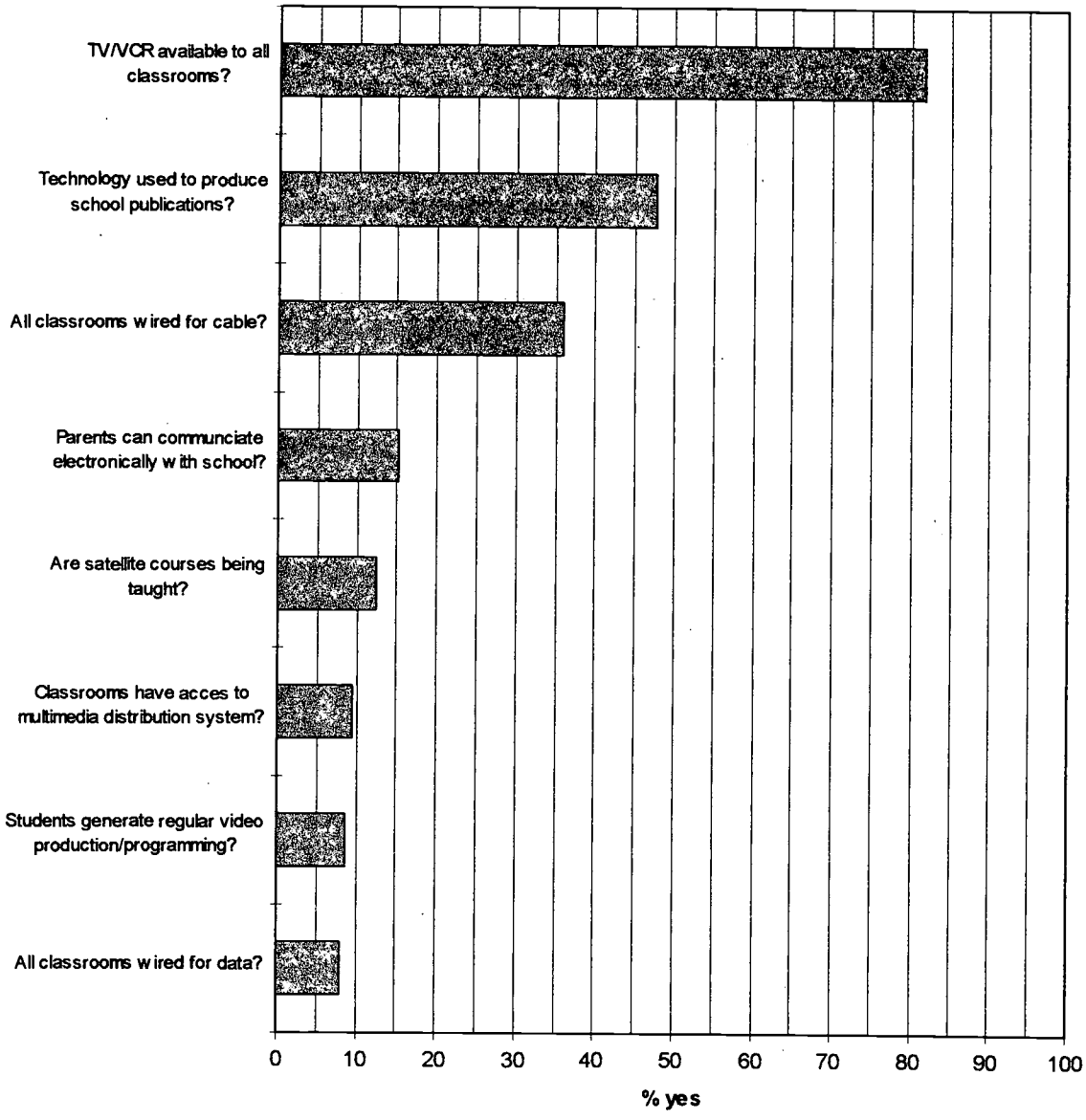


Figure 5: Is School Networked to Other Schools/Central Office?

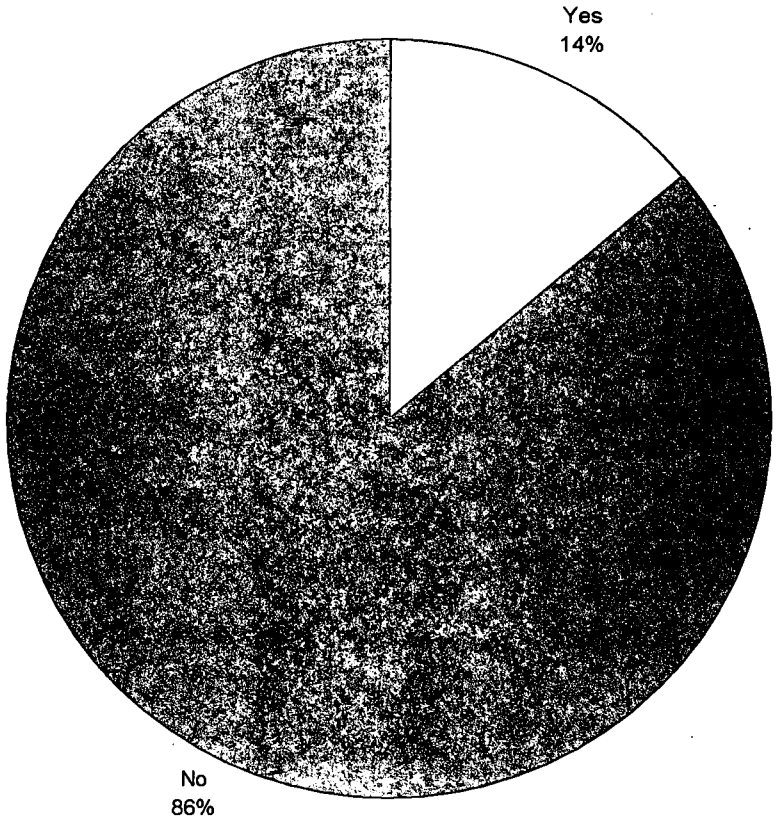


Figure 6: Library/Information Access

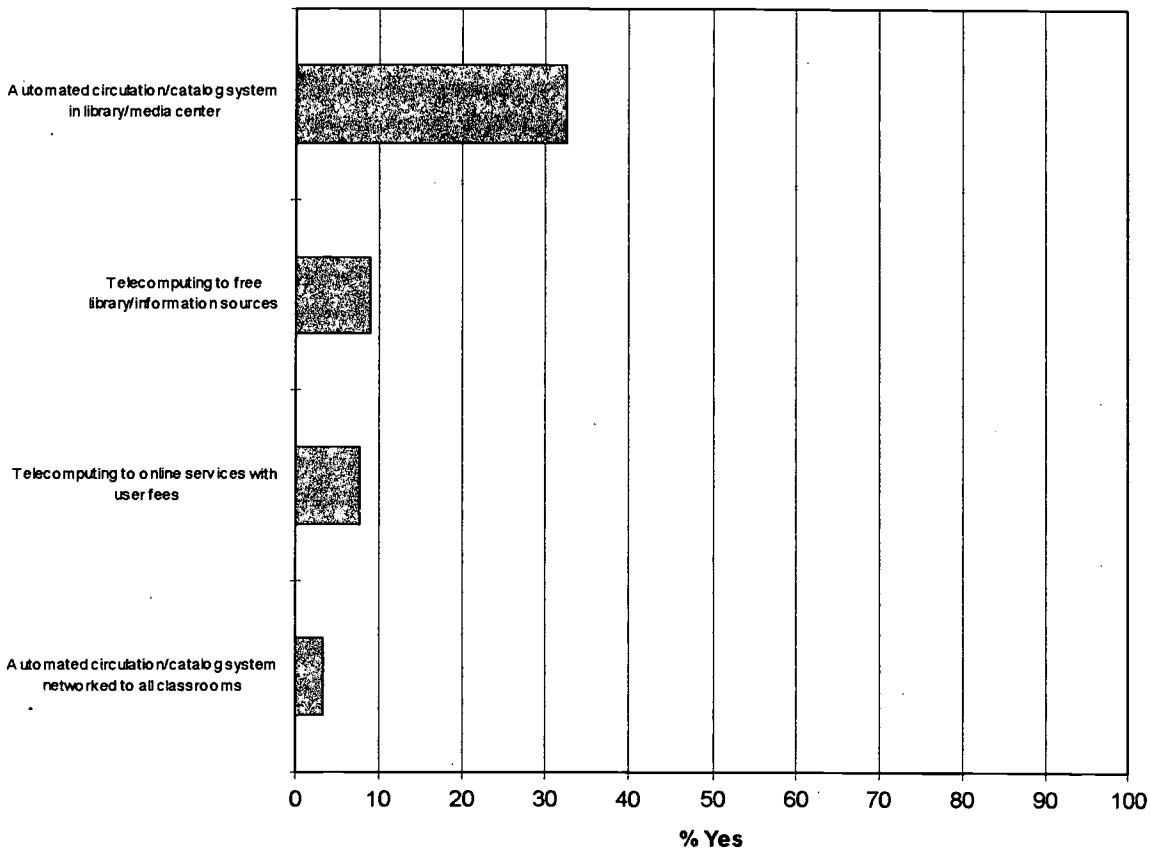


Figure 7: School/District Priority Needs

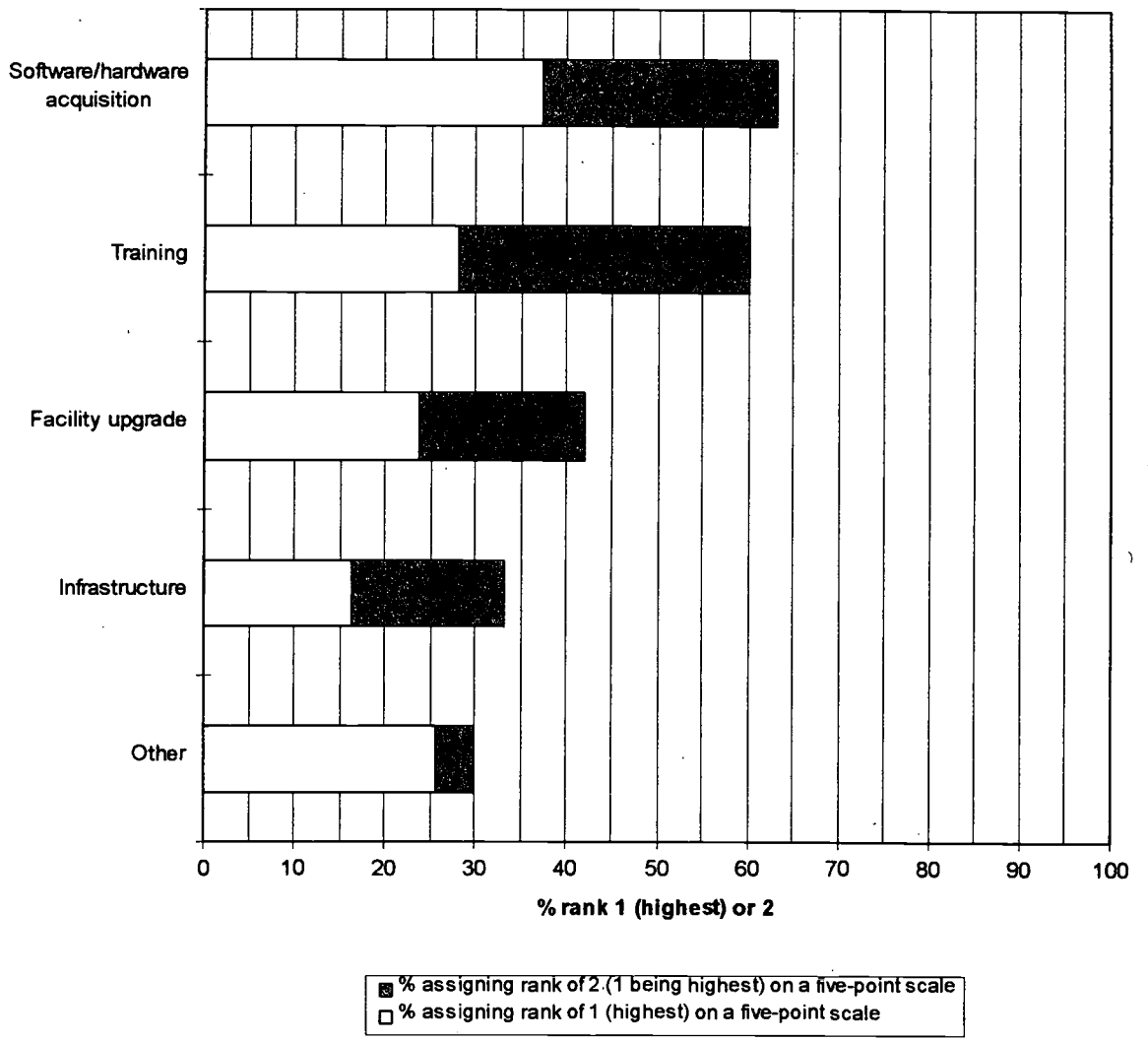


Figure 8: Teacher Comfort Level

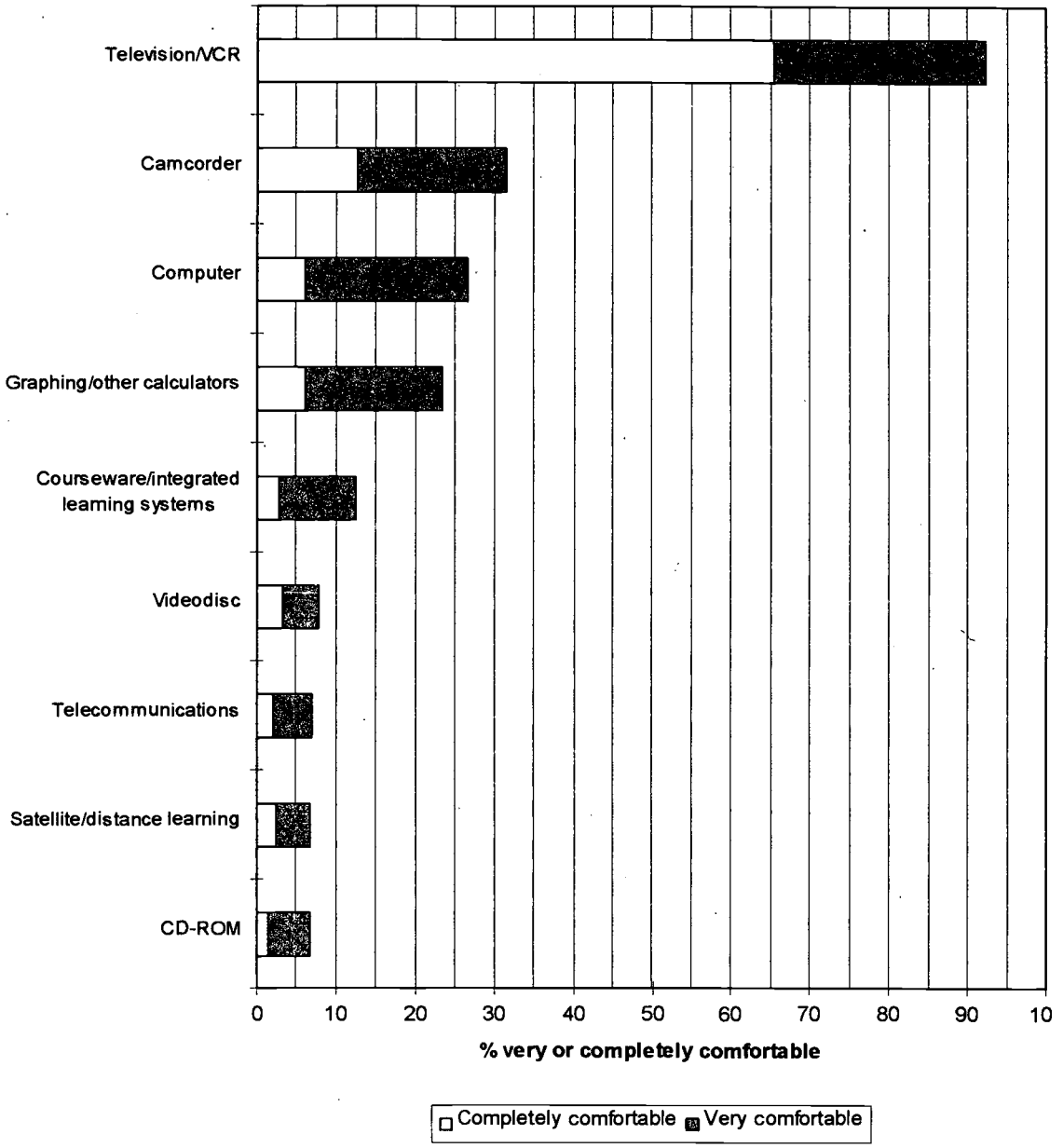


Figure 9: Does Your School Have a School-wide Network?

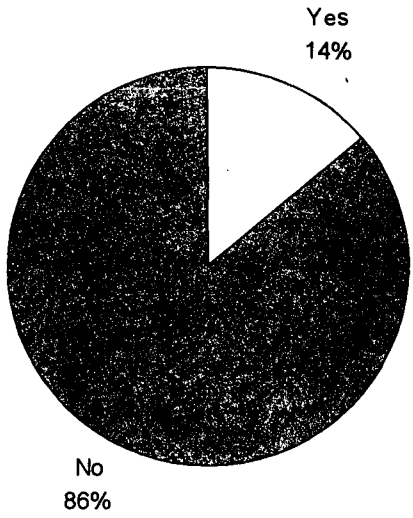


Figure 10: Estimated Number of Computers Per Classroom

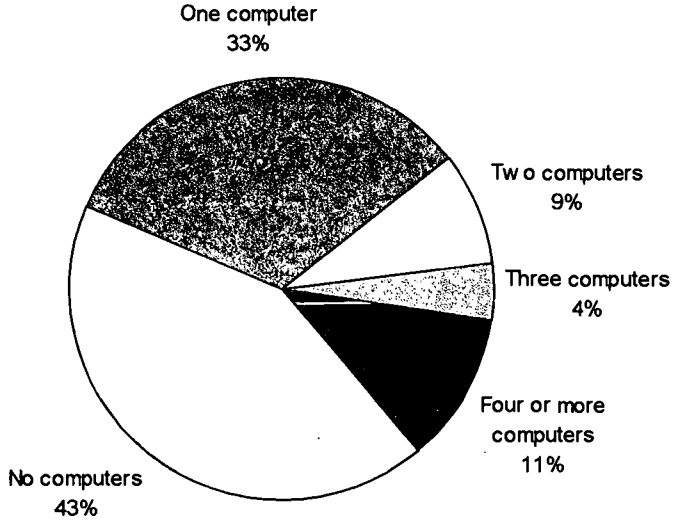


Figure 11: Does School Have a Written Technology Plan?

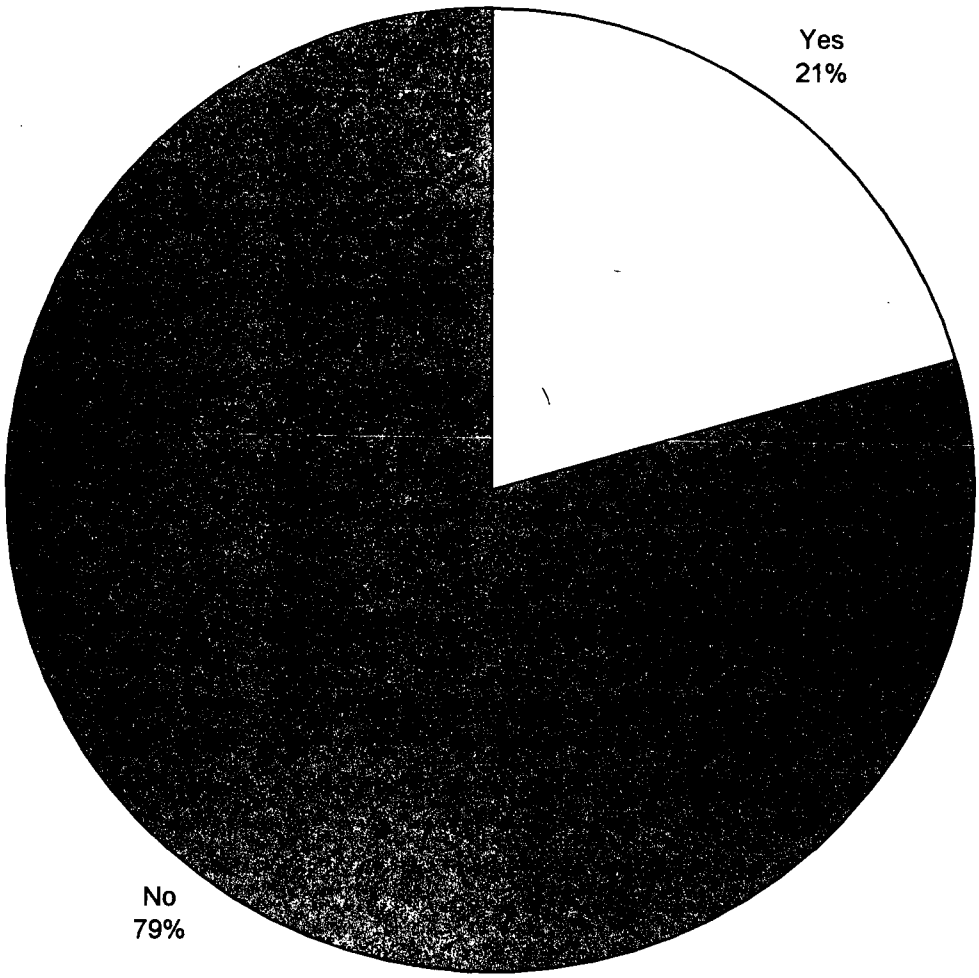
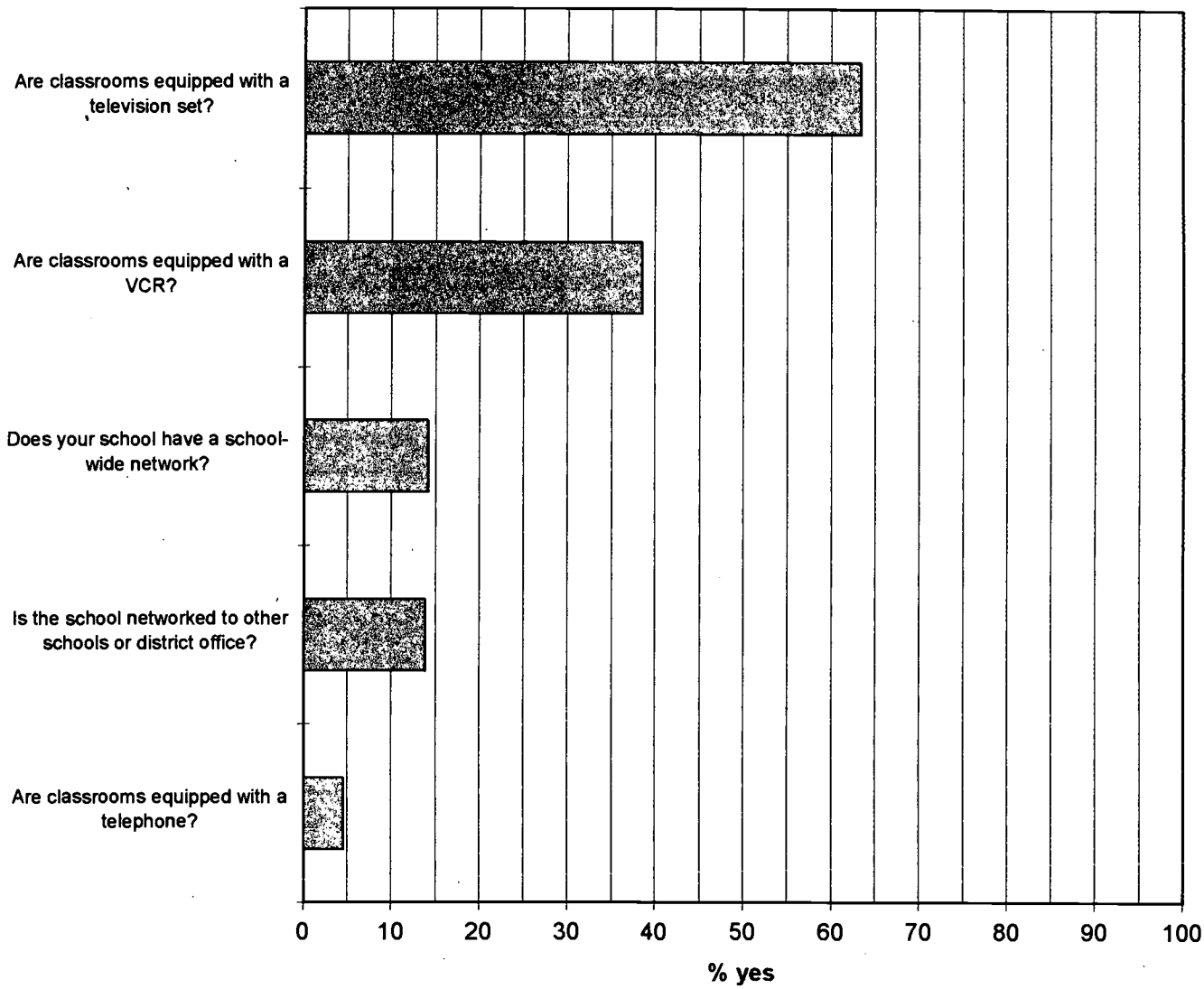


Figure 12: School Infrastructure and Capacity



Appendix D

Specifications

Technical Standards for Telecommunications

Wide-Area Networking (data)

There exists a pervasive defacto standard for wide-area networking in the educational community generically described as the Internet Model. Utilizing this model, the following standards have been set.

Data Network Protocol

The TCP/IP protocol is an open, standards-based protocol, available on virtually all computing platforms. The TCP/IP protocol operates over many different network types including Ethernet (10BaseT, 10Base2), ATM, TokenRing, and LocalTalk. The selection of a protocol should be the primary concern to ensure interoperability. The TCP/IP protocol offers the best selection for WAN-based communications and should be adopted by all agencies.

Network Data Transport System

The strength of the Internet model is that of interoperability with a wide variety of network transport systems. The most common transport systems are dedicated 56 KB and leased T1 lines. Also, switched high-speed ATM technologies are becoming more available. Each agency must adopt one of the recommended transport systems to meet their needs. Any data transport system adopted must be compatible with other systems. Currently the MDE and SBCJC have adopted frame relay service for data transport, IHL utilizes dedicated T1 s for data transport and has adopted the ATM transport technology as a standard for the future. ETV utilizes several transport systems including its microwave network. The Library Commission is relying on POTS (plain telephone lines) at the current time.

Local-Area Networking (building wiring)

It is recommended that either multimedia fiber-optic cabling or unshielded twisted pair (UTP) Category 5 copper wiring be used throughout each facility. The architecture should follow a horizontally segmented network feeding to a main distribution frame (MDF). While the 10 mbps Ethernet is the current standard for all sites, it is recommended to migrate to faster Ethernet cabling that runs at speeds of 100 mbps or more or to the ATM standard. Each site should allow for the MDF to include any video hardware and line charges by providers servicing that site.

Wide-Area Video Networks

It is important to understand that unlike the Internet model, the interactive video systems in the state are dedicated systems with specific demands outlined by the users and the network operators. Unlike the Internet access where a user can communicate from a workstation with virtually any other user nationally and internationally, the interactive video networks are setup or programmed to serve specific sites at specific times with interactive video to deliver instruction or to provide teleconferencing. Soon over 40 interactive video sites will be in operation in Mississippi. Adherence to common protocol is essential at this point for interoperability among each network to achieve full functionality of equipment. Unlike the Internet data model these networks generally do not share the ability to communicate with systems of other manufacturers on a national and international basis. Standards for video conferencing have been different for several years and are widely implemented by multiple vendors. The principle standards are H.320 which includes video and audio compression and T.120 for data sharing applications. K-12 and the state should avoid continued use and purchase of proprietary video conferencing solutions. Although national and international interoperability is not totally achievable at this time, this fact will not adversely effect the operation of the state video networks. All interactive video networks in the state use T1 telecommunications interconnectivity for transport. By compressing the video, interconnectivity costs are substantially reduced over the DS3-based equipment used as the basis for the first interactive video network (Fibernet). It is recognized by many in Mississippi that the current equipment is not suitably flexible that divides T1 bandwidth in half for the VTEL video conferencing. Bandwidth should be

allocated dynamically; that is, when there is no video conference on, bandwidth should be reallocated to other applications such as data. When video conferencing is needed, it should be given the bandwidth appropriate to the quality of signal required.

Video Via Internet

It is important to recognize the benefits of utilizing Internet as a vehicle to conduct basic video conferencing for distance learning. Even though network speed limitations limit video quality, this technology can be beneficial and can be accomplished with low equipment and operating cost. As network capacity increases and video compression technology improves, video quality will improve allowing expanded service.

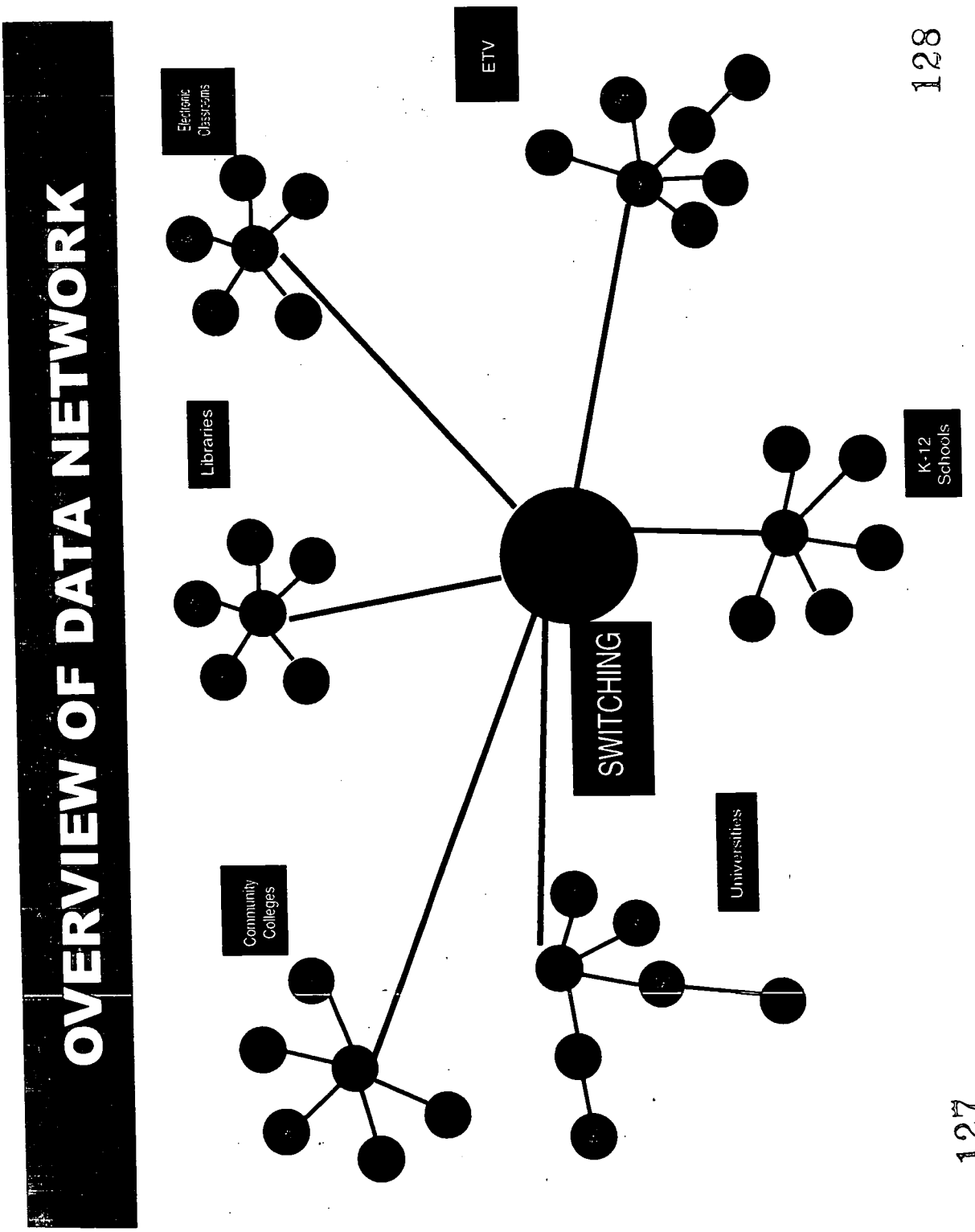
Video Network Transport

All interactive video networks used for distance learning and teleconferencing in the state use T1 telecommunications technology as transport. This connectivity is provided by a telecommunications provider (South Central Bell). Dedicated T1 lines transport video to MCUs (multipoint control units) which act as switches to direct instruction of teleconferencing to assigned locations. The MCUs are controlled by network coordinators at each educational entity's interactive video network control point. When video teleconferencing standards are finalized that are compatible with ATM switch technology, alternative video switching using ATM should be explored.

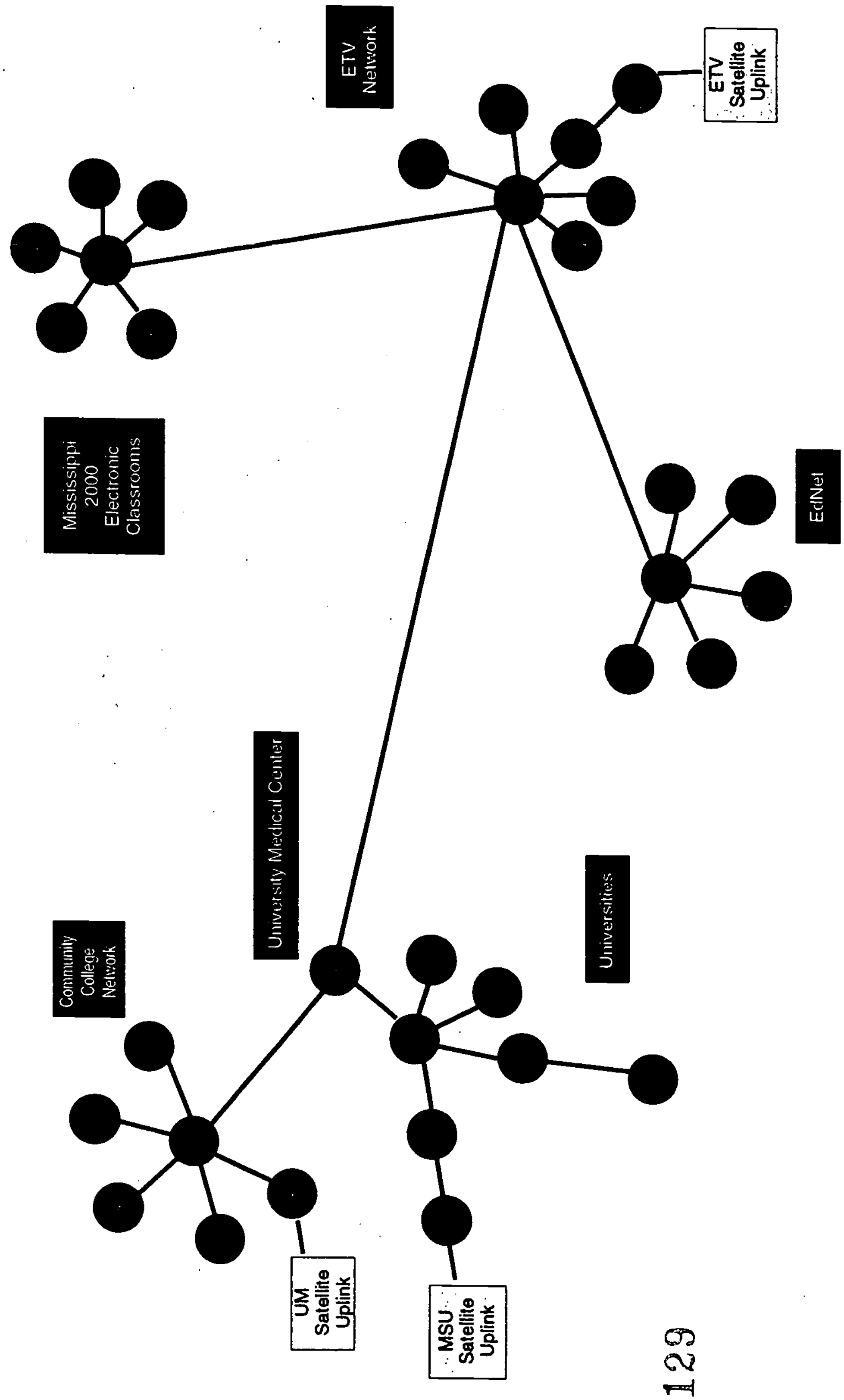
Interconnecting Video Networks

The benefits of interactive video networks can be amplified by providing the ability to link these networks. Fibernet 2000, CCN, IHL, and other educational institutions operate interactive video networks. By working collectively to schedule courses applicable to various entities, the number of sites receiving instruction can be greatly expanded. This does not jeopardize the autonomy of these networks. These networks can also be linked to EdNet to further expand the reach of curriculum into the home and additional sites that do not have the full interactive video equipment. EdNet receive-only sites can be established for $300-$400. Also, interactive video classes can be delivered concurrently to schools and institutions with satellite receive capability. In essence the offering of applicable courses simultaneously on multiple networks increases the efficiency greatly.

The **TECHNICAL SPECIFICATIONS** will be provided in a supplementary brochure and will be updated, revised and disseminated to local school districts as technologies and needs dictate.


OVERVIEW OF DATA NETWORK
Electronic Classrooms
ETV
Libraries
K-12 Schools
SWITCHING
Community Colleges
Universities
127
128

OVERVIEW OF VIDEO NETWORK



Appendix E

Key Questions for Technology Planning

Key Questions for Technology Planning

Some key questions that should be addressed by the various plan components may be expressed as follows:

Stakeholders and Community Resources

Is an ongoing information/awareness plan for communicating with stakeholders during the planning and implementation phases expressed in the plan?

Is there evidence of broad-based involvement of community stakeholders in the composition of the technology planning team?

Does the plan demonstrate that the district has investigated community resources and potential partnerships for acquisition of equipment and services?

Technology Vision and Mission Statements

Are education technology vision and mission statements included that were developed with participation of stakeholders?

Do the vision and mission statements express a commitment to:

- ¥ provide equity of technology access across the district, across grade levels, within subject areas, within classrooms, and for all student populations
- ¥ support the Mississippi Curriculum Structures
- ¥ improve the learning tools for students through implementation of education technology
- ¥ support professional development programs for implementation of education reform and integration of information technologies
- ¥ provide improved administrative efficiency and accountability

Assessment of Needs

As part of the planning process, has there been an assessment of the current education technology skills, knowledge, and attitudes of older students, teachers, and administrators?

Has an inventory of current software, hardware, and networking been accomplished as part of the planning?

Have curriculum strengths and weaknesses relative to Mississippi's education reform initiatives been identified in the plan?

What staffing currently exists for support of education technology integration?

Goals

Are goals established within the plan for:

- ¥ improved administration and management
- ¥ communications and information access
- ¥ improved curriculum and instruction

- ¥ improved student learning
- ¥ professional development for integration of education technology

Do the long term goals of the plan describe how the district's education technology initiatives will support schools and district-wide equity?

Do the goals of the plan describe how the district's education technology initiatives will:

- ¥ support learning outcomes as expressed in Mississippi's Curriculum Structures
- ¥ address the needs for teaching and learning identified in the assessment process

Education Technology Design

Does the education technology design indicate software priorities, in terms of functionality, for:

- ¥ administration and management
- ¥ communications and information access
- ¥ instruction and curriculum

Does the education technology design indicate hardware, network, and facilities improvement priorities to include:

- ¥ workstations and peripherals
- ¥ network design
- ¥ building and classroom wiring

Long- Term Strategies and Timelines

Has a multi-year strategy been established for phased accomplishment of:

- ¥ software acquisition
- ¥ hardware acquisition
- ¥ development of local-area and wide-area networks

Have multi-year strategies been defined for:

- ¥ operations
- ¥ software and equipment maintenance
- ¥ professional development
- ¥ human resources

Action Plan in Support of Education Technology Goals

Are objectives, activities, leadership, timelines, and budgets specified for various initiatives for at least the first year of the plan?

Does the plan include specific year-one initiatives for software procurement; hardware, facilities, and network acquisition and implementation; and operations, maintenance, and upgrades?

Do the year-one professional development plan initiatives provide adequate support for the integration of technology into the curriculum?

Do the human resources proposed in year one adequately support the technology initiatives?

Expected Results

What long-term improvements in teaching, learning, and management are expected?

Monitoring/ Evaluation

Does the plan establish an ongoing process for monitoring and evaluating the implementation of the plan?

Does the plan include a process for ongoing revisions incorporating information from the evaluation?

Financial Considerations

Is there a plan to secure long-term funding in support of the technology initiatives that include potential funding sources, such as: district budget, bond issues, local education foundations, grants, business partnerships, etc.?

Does the plan include a multi-year budget summary for the technology initiatives with a breakout for hardware, software, infrastructure, professional development, and staffing?

Appendix F

Sample Table of Contents

Sample Table of Contents

These two tables of contents are provided as samples of tables of contents for local technology plans. School districts are free to develop their own table of contents as long as they include **all of the required components found in Section 5.4.**

Sample A

Table of Contents for Local Education Technology Plan

Sample B
Table of Contents for a Local Education Technology Plan

Cover Sheet and Title Page—attractive, including name of the district and date of preparation

- Table of Contents
- Acknowledgments
- Executive Summary
- Vision Statement
- Mission Statement
- Demographics
- Committee Membership
- General Information
- Data Collection, Analysis, Reporting
- Critical Issues-to include but not limited to:
  - Stakeholders
    - Involvement (Student, Parent, Community, Business)
    - Personnel (Hiring, Staffing and Relations)
    - Incentives -- Reward System for Teachers
    - Public Relations
  - Physical Plant
    - Facilities
    - Equipment
    - Networking
    - Maintenance
    - Obsolescence
    - Ergonomics
    - Security
  - New and Emerging Technologies
  - Support
- Professional Development
- Instructional/Curriculum Development
- Technology Integration into Curriculum
- Administrative Issues, such as Legal Aspects
- Implementation Plan and Timeline
- Evaluation and Monitoring Plan
- Budget (may elect to put in the Appendix instead)
- Finances
- Bibliography
- Glossary
- Appendices
- Index

Appendix G

Sample Local Education Technology Planning Task and Responsibility Matrix

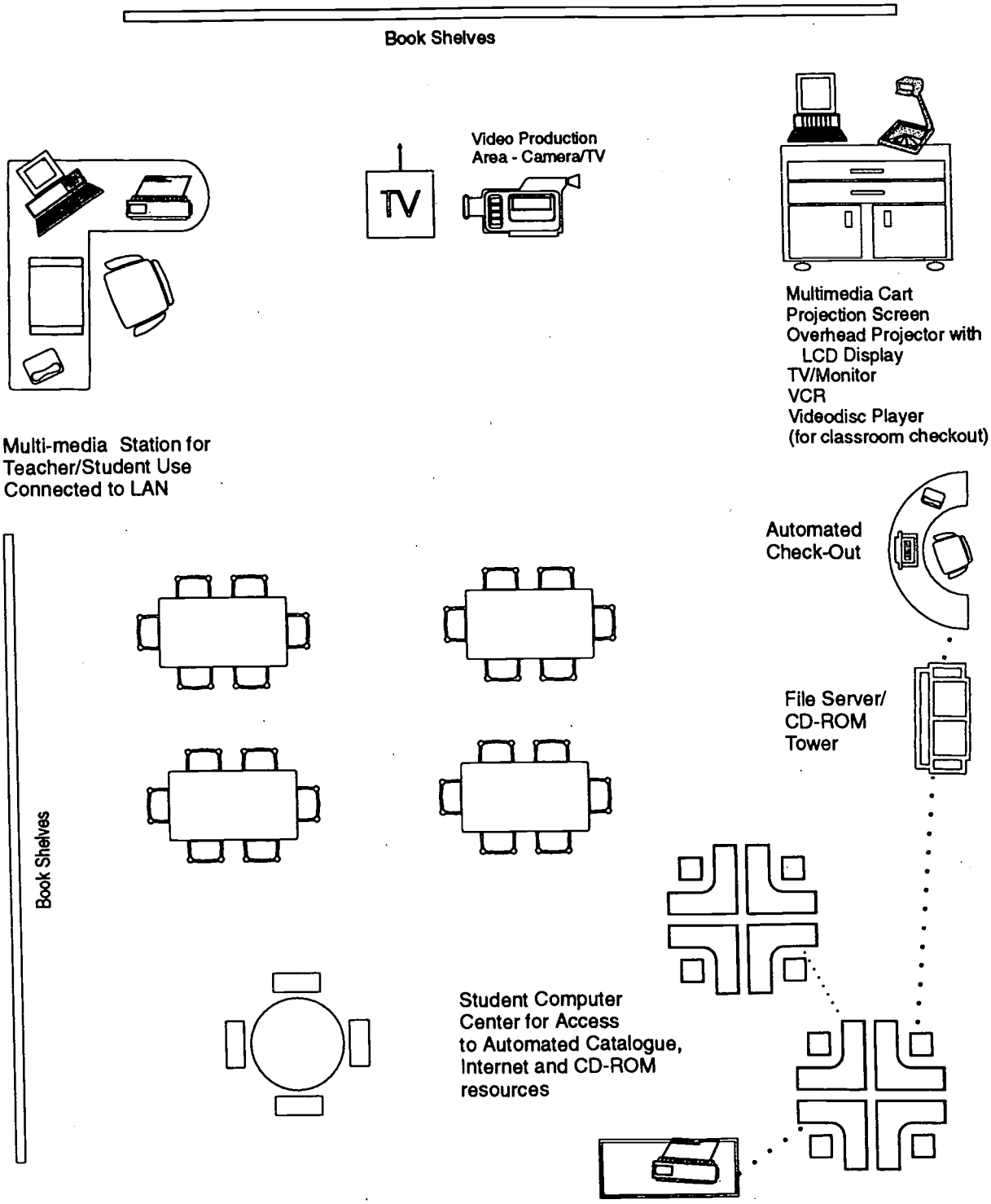
Sample Local Education Technology Planning Task and Responsibility Matrix

Task #	Task Description	Person(s) Responsible	Start Date	Finish Date	Resources Required
Stage One	**Organization of Technology Planning Process**				
	Form technology planning committee.				
	Gain administrative support and approval.				
Stage Two	**Preparation for Planning**				
	Prepare and/or refine vision and mission statements.				
	Communicate vision/mission to stakeholders.				
	Investigate current and emerging technology				
	Identify best practices regarding education technology.				
	Gather background information.				
Stage Three	**Assessment of Current Status**				
	Conduct a needs assessment.				
	Conduct technology inventory.				
	Conduct analysis of facilities.				
	Examine district/school academic and curricular strengths and weaknesses.				
	Review current status of professional development.				
	Examine administrative needs for education technology.				
Stage Four	**Goal Definition**				
	Review analyze and report data.				
	Define goals based on data analysis.				
Stage Five	**Development of the Implementation Plan**				
	Develop strategies and timelines for implementation.				
	Determine priorities and anticipated results.				
	Determine cost and prepare budget.				
	Begin preparation of document.				
	Mount a public relations campaign.				
	Construct cost matrices and line item budget for technology needs.				
Stage Six	**Monitoring and Evaluation**				
	Establish monitoring and evaluation of plan.				
	Establish a revision schedule.				

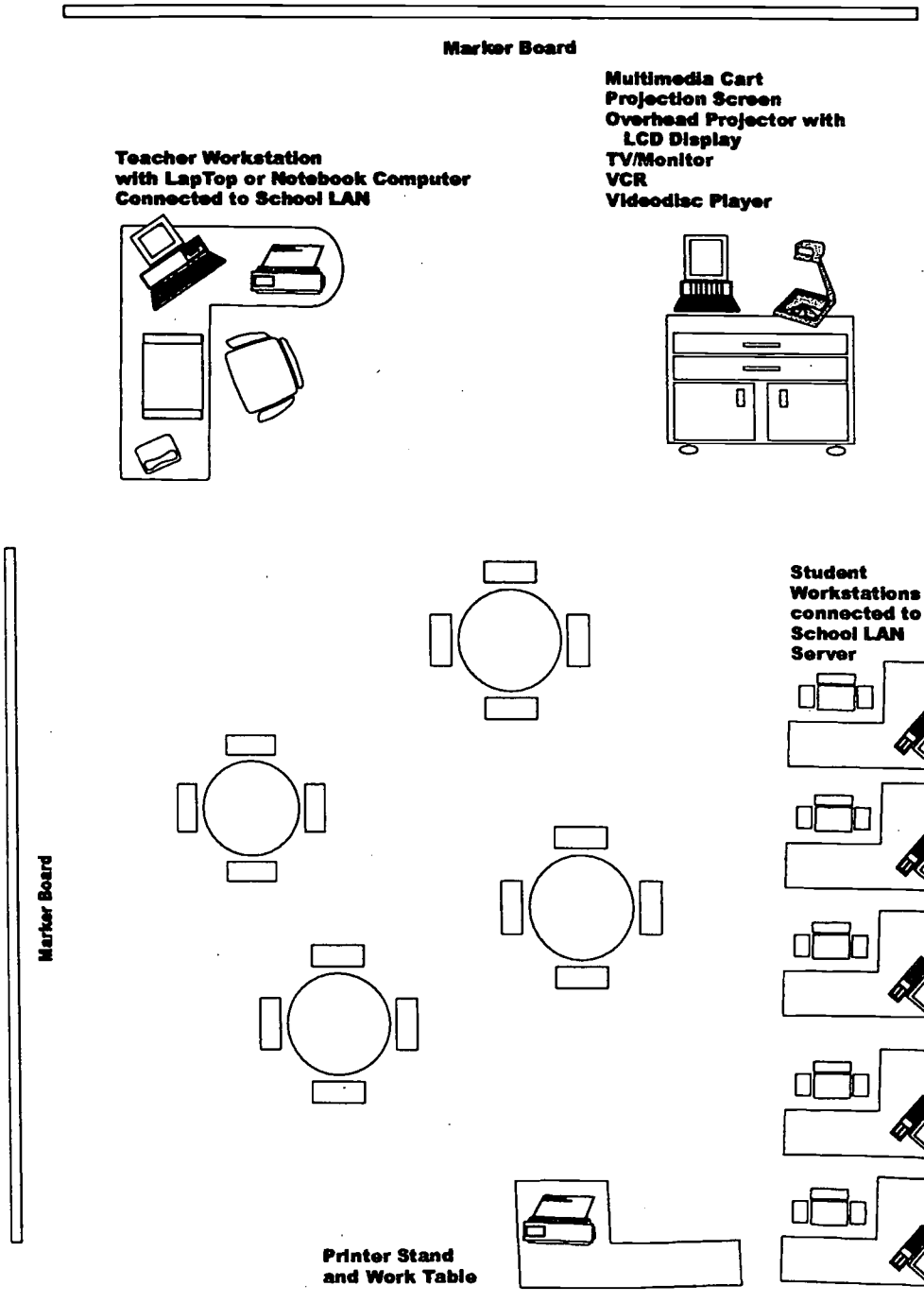
Appendix H

Sample Technology Configurations

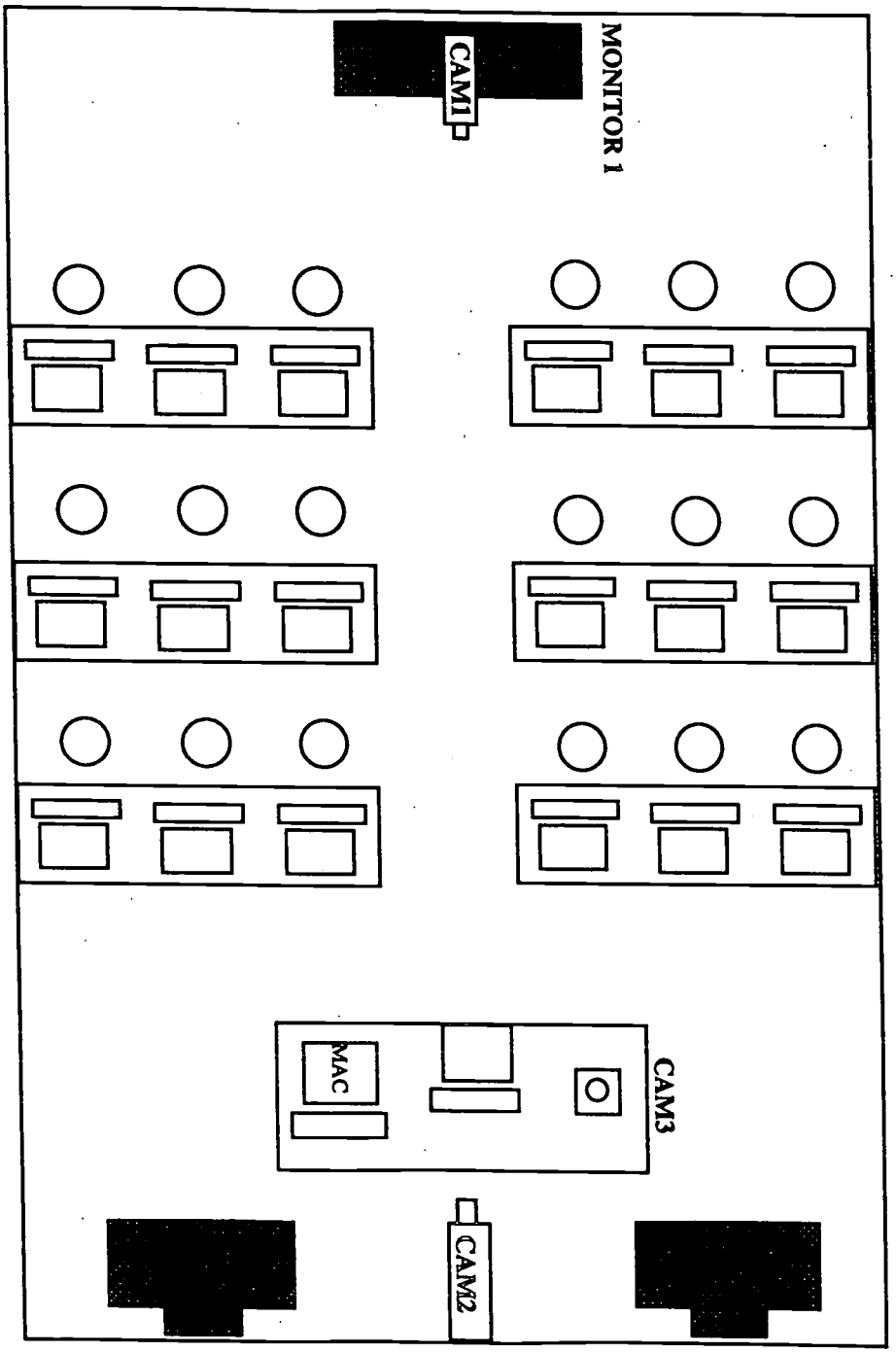
INSTRUCTIONAL TECHNOLOGY CLUSTER MEDIA CENTER ALTERNATIVES



INSTRUCTIONAL TECHNOLOGY CLUSTER CLASSROOM ALTERNATIVES



Sample Video-Conference Classroom



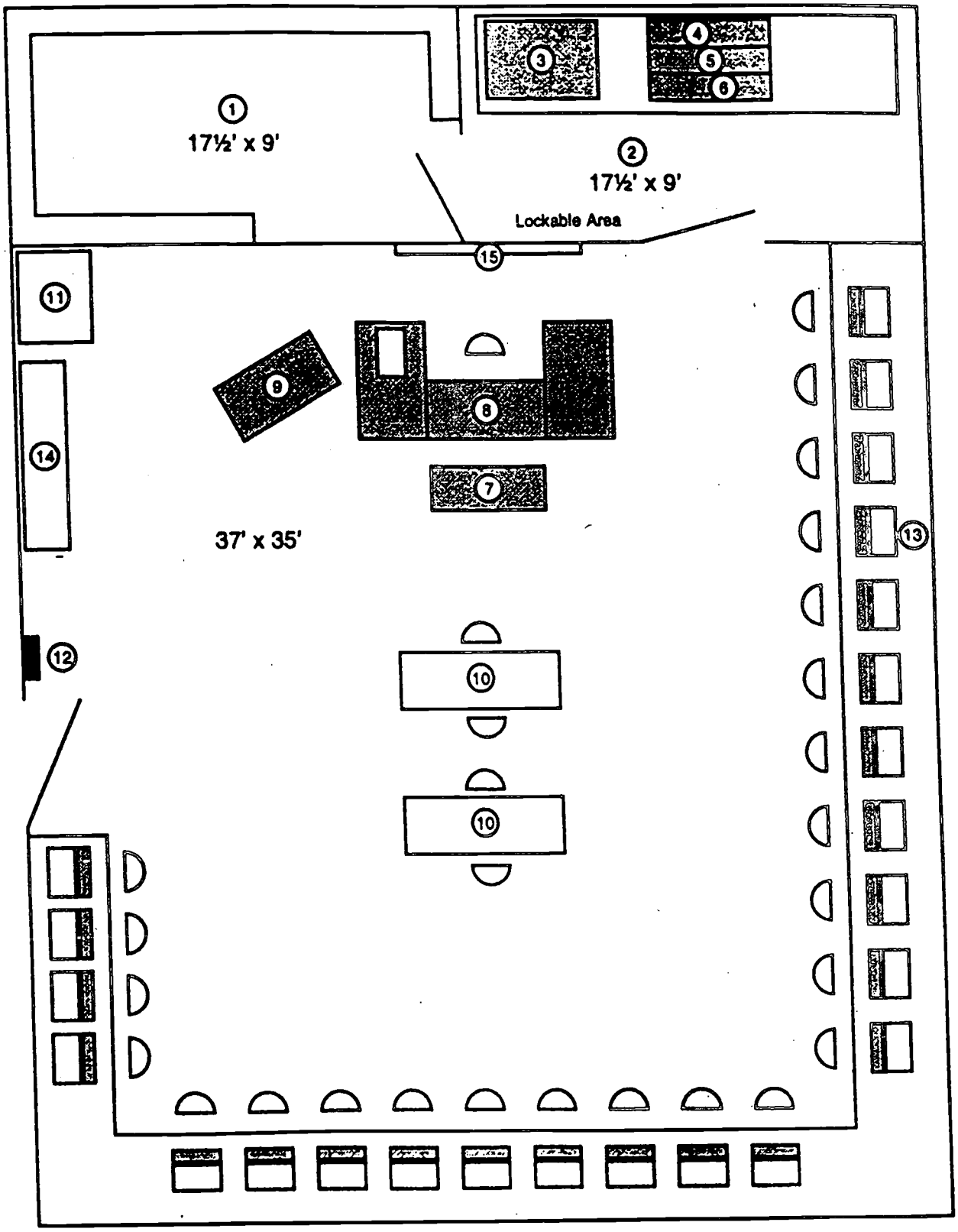
Legend

Computer Laboratory Figures

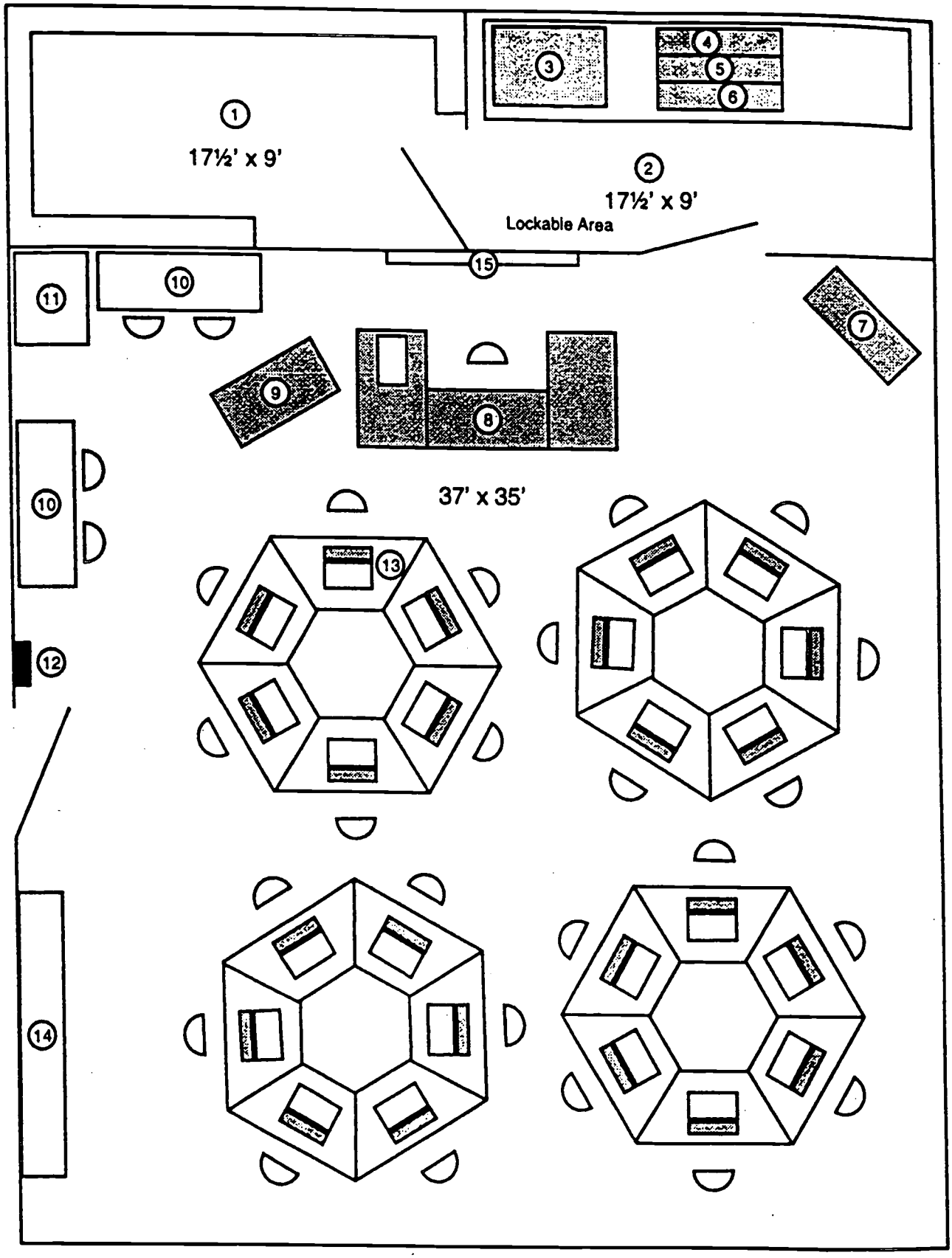
(for pages H-5 and H-6)

1. Storage room with cabinets and shelves
2. Network equipment area (ventilated)
3. Laser printer
4. File server on a separate electrical circuit
5. Uninterruptable power source (UPS)
6. Telephone interface (for optional Internet connection equipment0
7. Dot matrix printer
8. Teacher workstation and chair
9. AV cart
10. Work tables (2), side chairs (4)
11. File cabinet
12. Master on/off switch
13. Student workstations with chairs
14. Bookcase
15. White board

Computer Laboratory A



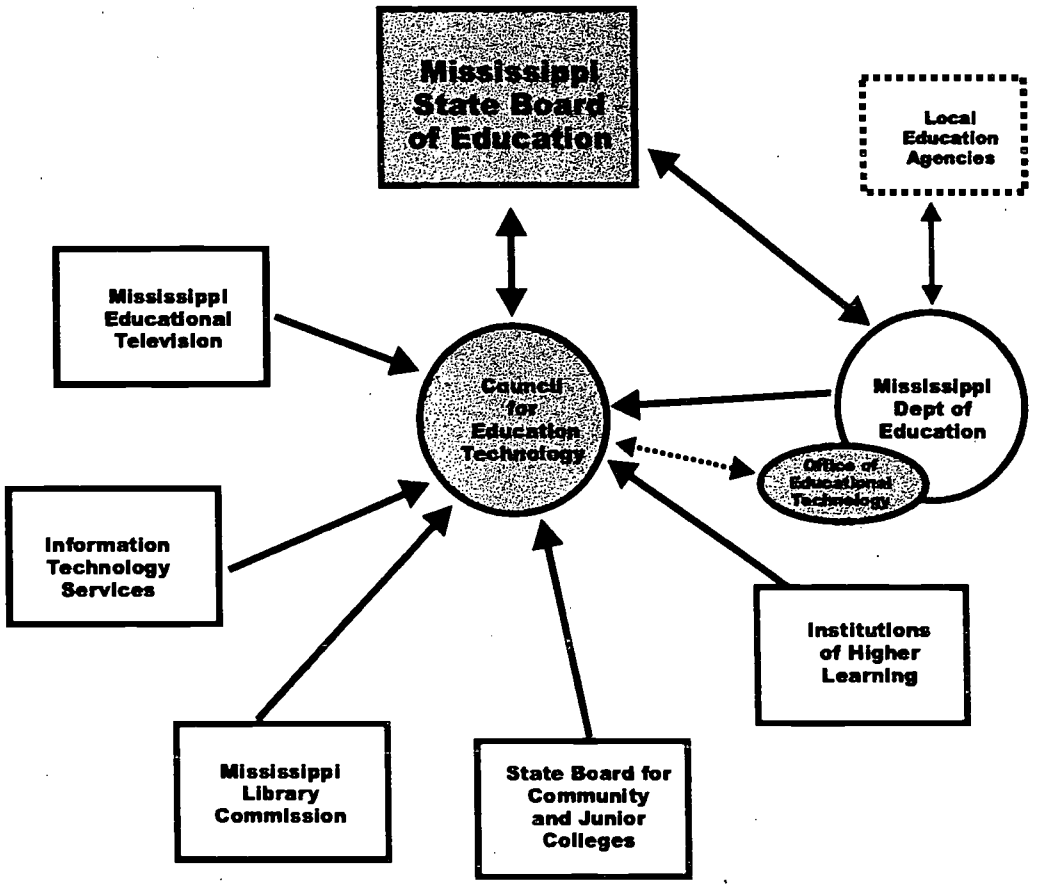
Computer Laboratory B



Appendix I

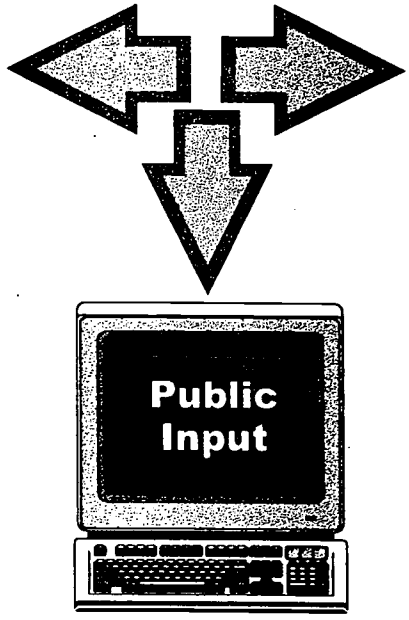
Council Structure

Council for Education Technology Organizational Structure



Council For Education Technology

Telecommunications
Distance Learning
Vendors
Staffing/Training/Certification
Professional Development -
Inservice and Preservice
Curriculum/Instruction
Evaluation/Accountability



TeleTalk with ETV
Public Hearing - Grenada
Video-Conference Hearings for:
Booneville
Clarksdale
Ellisville
Gulfport
Raymond
Summitt

Telecommunications
Subcommittees:
Common Needs
Technical Specifications/
Operations Capacity
Technology/Vendor Exposition

Appendix J

Tech Prep Initiatives

THE MISSISSIPPI TECH PREP INITIATIVE

The Tech Prep Initiative is an important part of Mississippi's long range plan for the integration of technology into the classroom. It is a response to the challenge of producing highly skilled and productive employees of the 21st Century. This initiative provides students with the skills and competencies needed in the workplace today and tomorrow. It is a concentrated, coordinated approach to lifelong learning and earning. Through this unique program, Mississippi students can be a part of a workforce that will ensure the state's ability to thrive in the future. This will further ensure the advancement and success of the student. The five goals of the program are:

- ¥ Improve the academic and technical competence of all students
- ¥ Develop foundations and adaptive skills for success on the job
- ¥ Respond to the needs of Mississippi's employers by increasing the number of highly skilled graduates
- ¥ Ensure a smooth and successful transition from secondary to postsecondary education programs and workforce
- ¥ Increase enrollment in quality educational programs for students who are members of special population groups.

Major Components

The major components of the Initiative are:

- ¥ Career (Grade 7), Computer (Grade 8), Technology (Grade 9) Discovery Courses
- ¥ Applied methodology instruction in academic courses
- ¥ Articulation of academic and vocational-technical programs within and between the high schools and community/junior colleges
- ¥ Sequential courses of study for high school students
- ¥ Career/Educational Plan for every student
- ¥ Career Centers in high school
- ¥ Professional development for school personnel
- ¥ Work-based learning programs.

Implementation of Mississippi Tech Prep

Statewide implementation of the initiative involves a gradual increase in school district participation. The number of districts participating in Tech Prep by year is listed below:

Year	Number of Sites
1993-94	15
1994-95	51
1995-96	24

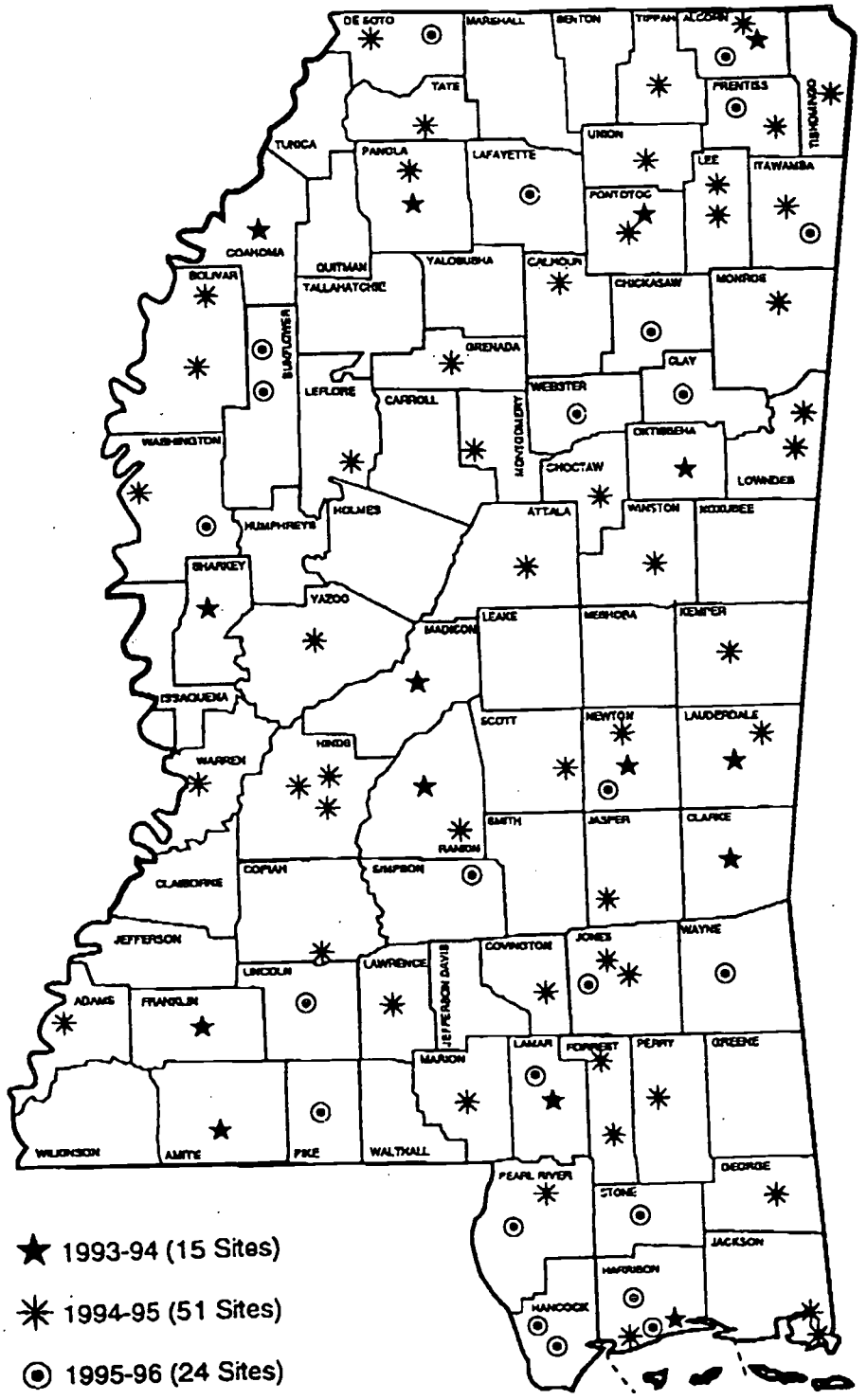
As of school year 1994-95 the following accomplishments have been made:

Accomplishment	Number
Functional Tech Prep sites	65
Enrollment in Career Discovery (Grade 7)	4,091
Enrollment in Computer Discovery (Grade 8)	3,492
Enrollment in Technology discovery (Grade 9)	1,099
Mathematics/Vocational Teachers trained in Applied Methodology	241
Science/Vocational Teachers trained in applied methodology	216
Language Arts/ Vocational Teachers trained in applied methodology	203
Career Centers	63
Completed Career/Educational Plan	6,632
Academic and Vocational/Technical Programs articulated and sequenced	162
Number of Occupational Programs assessed	64
Enrollment in work-based Learning Programs	49

Relationship Between Tech Prep and SB3350 Initiatives

The goals for the Tech Prep initiative and the Technology in the Classroom initiative set forth in SB3350 are complementary. Although funded from different sources, both programs seek to improve the academic performance of students and prepare them for the 21st Century. Both initiatives also have a strong training component designed to improve professional development for school personnel. This *Mississippi Master Plan for Education Technology* is designed to fill the technological gaps and further enhance the classrooms of Mississippi that are not touched by the Tech Prep initiative, such as the elementary classroom. The symbiotic relationship between the Tech Prep initiative and the Technology in the Classroom Initiative is one that promises to move Mississippi forward educationally and economically.

Mississippi Tech Prep Sites



Appendix K

Glossary

GLOSSARY OF TERMS

Adaptive Devices - See Assistive Devices

Administrative Technology Applications - computer software applications designed to improve the delivery and accuracy of administrative responsibilities and functions

Appletalk - A local area network developed by Apple Computer that can be used by both Apple and non-Apple computers for communication and sharing of resources such as printers and file severs.

Assistive Devices - Any item, piece of equipment or product system, whether acquired commercially off the shelf, modified, or customized that is used to increase, maintain or improve the functional capabilities of individuals with disabilities.

Asynchronous Transfer Mode (ATM) - A high bandwidth, controlled-delay fixed-size packet switching and transmission system. ATM is also referred to as "cell relay".

Automated Circulation System - A library system in which some or all of the activities related to the loan of library materials is performed by computerized procedures.

Average Daily Attendance (ADA) - A system used by the Department of Education to determine an average number of students attending school on a monthly basis for each school district. The formula used by MDE is: *The total number of days per attendee for all attendees divided by the tool number of days taught per reporting month.*

Backbone - A high speed connection that links many networks.

Bandwidth - The range of transmission frequencies that a network can use. The greater the bandwidth, the greater the amount of information that can travel on the network at one time

Bit - An element of a byte that can represent one of two values, on or off.

Broadband - A transmission method that occurs when the network's range of transmission frequencies is divided into separate channels, with each channel used to send a different signal.

Byte - Each storage location within main memory, identified by a memory address.

Central Processing Unit (CPU) - The unit that executes programmed instructions, performs the logical and arithmetic functions on data and controls input/output functions.

Channel One - A 12-minute daily news and information program offered to K-12 schools by the Whittle Educational Network.

Coaxial Cable (COAX) - A transmission medium noted for its wide band width and it low susceptibility to interference. Signals are transmitted inside a fully enclosed environment - an outer conductor or screen which surrounds the inner conductor.

Communication Age - Refers to the approaching century that will demand that students develop new roles in learning, living and working to meet the challenge of the world of technology and change.

Compact Disk Read Only Memory (CD-ROM) - A prerecorded, non-erasable disc that can store over 650MB of digital data equal to 250,000 pages of text or 20,000 medium resolution images.

Compressed Video - Video and audio signals converted from regular analog signals to digital signals, making it possible for a network to carry more information.

Computer Applications - The use to which a processing system is put, such as word-processing and creating spreadsheets and mailing lists.

Computer-Assisted Design (CAD) - A term applied to programs (and workstations) used in designing engineering, architectural, and scientific models ranging from simple tools to buildings, aircraft, integrated circuits, and molecules.

Computer-Assisted Instruction (CAI) - a type of educational program designed to serve as a teaching tool. CAI programs use tutorials, drills, and questions-and-answer sessions to present a topic and to test the student's comprehension.

Curriculum Integration - The process of organizing curriculums to cut across subject matter lines to focus on broad areas of study.

Data Transport System - A system whereby information from one location is transferred to another in a communication system.

Data Network - A communication system used for data transmission that has the potential to provide multiple access paths among users.

Distance Insensitive - A method of charging for circuit services based on reasons other than distance such as duration or volume of data.

Distance Learning - An organized system of delivering educational information and materials between two or more geographically separate sites through a variety of transmission modes.

District Level WAN - A wide area network that spans a large geographical area, such as one that connects schools to the district and state office.

DS3 - see T3

E-Mail - Messages that are sent electronically over telephone and computer networks that may be stored and read at the receiver's convenience.

Ed Net - A not-for-profit corporation (MS Educational Television, Mississippi Dept. of Education, State Board for Community and Junior Colleges, and Institutions of Higher Learning) that oversees the utilization of ITFS channels in Mississippi.

Ergonomics - The study of people in relation to their working environment (the furnishing and machines they use). The goal of ergonomics is to incorporate comfort, efficiency, and safety into the design of keyboards, computer desks, chairs, and other items in the workplace.

Express Products Lists (EPL) - A simplified method of purchasing equipment through a state approved bid process.

Fiber Optics - A signal conducting medium that conveys light waves through transparent fiber. It allows high speed transfer of voice, video, and data.

Fibernet 2000 - A public/private partnership providing distance education for students and inservice programs for teachers via a compressed video and data network in Mississippi.

File Transfer Protocol (FTP) - An Internet protocol that allows for files and programs to be moved or downloaded from one computer to a remote computer.

Frame Relay Cloud - A form of packet switching technology that allows for the transfer of information at T- or 56K speed

Full-Motion Video - A standard video signal for 30 frames per second and 525 horizontal lines per frame, which is capable of complete action.

Gigabyte (Gb) - A measurement of memory space equal to a billion bytes.

Goals 2000 - A program administered by the U.S. Department of Education based on voluntary national education goals by the year 2000.

Gopher - Software which permits searching of files on the Internet or remote hosts using layered menus. Text from these files can be read on-line or transferred to a computer.

Graphing Calculators - A small and inexpensive tool that allows users to actually graph equations at the touch of a button.

Hardware - The physical components of a computer system, such as circuitry, keyboard, and display.

Individualized Educational Plan (IEP) - A document that outlines the special education services, the related services and the regular education services that the student with disabilities will receive during a one year period.

Infrastructure - The basic facilities, equipment and installations needed for the functioning of a system.

Inquiry based learning - Method of learning in which students must seek information to solve problems or to explain phenomenon they do not understand.

Interactive Media - A program that interacts with the user, who is usually (although not necessarily) sitting at a display of some sort and who is using some sort of input device to provide responses to the program.

Interoperability - The ability to communicate execute programs, or transfer data among various functional units in a way that requires the user to have title or no knowledge of the unique characteristics of those units.

Instructional Television Fixed Service (ITFS) - The specific band of microwave frequencies set aside by the FCC for educational use.

Laserdisc player - A device that uses a laser to read information that has been encoded in a series of pits engraved in a video disk. It provides video and audio playback for prerecorded videodiscs.

Life-long Learning - A term which signifies the organizational and didactic structures and strategies that permit learning to take place from infancy throughout adulthood.

Local Area Network (LAN)) - The linkage of computers and/or peripherals in a limited area, usually less than two miles, that allows users to communicate and share information.

Megabyte (Mb) - A measure of memory equal to one million bytes.

Megahertz (MHZ) -One million cycles per second.

Microwave transmission - Sending high frequency radio waves from a tower at one point through the air to a receiving dish at another site.

MONEX (Mississippi On-line Network Exchange) - A dial-up modem system used by MDE for collecting and disseminating data to and from local school districts.

Mouse - An electronic device that controls movement of a cursor on a video display, terminal, or monitor, when the user by hand rolls the device along a flat surface.

Multimedia - The mixing of text, graphics, video and audio on a single computer.

On-line - Establishing a connection with another computer via telephone lines or through a network.

Paradigm - A fundamental concept that underlies a possible complex structure; the central kernel in a concept. New paradigms result in new concepts.

Random access memory (RAM) - A storage device into which data can be entered and read. Information stored is lost when the computer's power is turned off

Router - A device (sometimes a specialized computer) that stores addresses of network hosts and forwards packets of data between networks. For maximum access to the Internet's resources, a local area network needs its own router.

Software - A program or set of instructions that tell a computer how to accept and manipulate data in order to turn it into information.

T1 - A digital transmission line that carries data at a rate of 1.544 Megabits per second.

T3 - A digital transmission line and carrier of 45 mbs bandwidth; one T3 Channel can deliver 28 T1 channels or 672 voice circuits used for digital video transmission or for major PBX-PBX telephone interconnection.

Telecommunications - The transfer of data from one location to another over communication lines.

Telecomputing - A subset of telecommunications, which is the process of communicating electronically from one place to another. Telecomputing is a more specific term referring to computers communicating electronically, mainly over telephone lines.

Teleconferencing -Simultaneous visual and/or sound interconnection using telecommunications links that allow individuals in remote locations to see and communicate with each other in a conference arrangement.

Teleteaching - Instruction provided using the interactive audio, graphics and/or video capability of a telecommunication network to provide remote interactive training.

Telnet - An Internet service that allows users to log on to remote host computers as "guest" users, providing access to the files as if they were actually at the host site.

Token Ring - A standard network architecture in which a ring topology is passed sequentially from station to station to prevent collision. Only that station processing the token can communicate on the network.

Transmission Control Protocol/Internet Protocol (TCP/IP) - A set of computer commands that dictate how the computers on the Internet will communicate with each other.

Two-way Video and Audio - The ability to transmit and receive pictures and sound simultaneously in real time.

Two-Way Data - Communication in which data are transferred in both directions, i.e. transmitted and received, at the same time.

Upgrade - The process of changing to a newer, usually more power version of a computer system or component.

Uplink - A satellite dish that transmits signals up to a satellite. These signals are then sent back to Earth to a downlink (receiving) site.

Video Conferencing - A form of teleconferencing where participants see and hear other participants in remote locations. Video cameras, monitors, codecs, and networks allow synchronous communication between sites.

Wide Area Network (WAN) - A computer network in which widely dispersed computers, such as those among several buildings or across a city or state, are interconnected. WANs make use of a variety of transmission media, which can be provided on a leased or dial-up basis.

Wireless - Voice, date, or video communications without the use of connecting wires. In wireless communications, radio signals make use of microwave towers or satellites. Cellular telephones and pagers are examples of wireless communications.

World Wide Web (WWW) - A hypermedia information retrieval system linking a variety of Internet-accessible documents and data files (text and graphics). Often referred to as "the Web."

Acronyms

ADA - Average Daily Attendance
CCN - Community College Network
CCSSO - Council of Chief State School Officers
CELT - Center for Educational Leadership and Technology
CET - Council for Education Technology
IHL - Institutions of Higher Learning
ITS - Information Technology Services
ISTE - International Society for Technology in Education
MDE - Mississippi Department of Education
MDF - Main Distribution Frame
METV - Mississippi Educational Television
MIS - Management Information Services
NCATE - National Council for Accreditation of Teacher Education
OET - Office of Educational Technology
OSE - Office of Special Education
PBS - Public Broadcast System
SBCJC - State Board for Community and Junior Colleges
SMTP - Simple mail Transfer Protocol
TIC - Technology in the Classroom
UTP - Unshielded Twisted Pair
VSAT - Very Small Aperture Terminal

Appendix L

List of Resources

List of Resources

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