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ABSTRACT

The purpose of this study was to determine what recent progress had been made in Georgia public elementary school library media centers regarding access to advanced telecommunications and computer technologies as a result of special funding. A questionnaire addressed the following areas: automation and networking of the school library media center and use of video distribution systems, telecommunications and satellite access, faculty development, short-term technology planning, and funding sources for technology. Of the 298 survey questionnaires mailed to elementary library media specialists, a total of 214 usable surveys were returned. Results are reported in tables showing percentages and frequency of responses. Almost 40% of public elementary schools had automated the library media center and 61% had implemented a video distribution system prior to 1993-94, which was before the state began using lottery funds for education. Lottery appropriations funded implementation of automated library systems in 51% of Georgia's elementary SLMCs, installation of video distribution systems in almost 29% and satellite dish installations for distance learning capabilities in 92% of the elementary schools. Internet service was available in 63% of the elementary schools, and the remaining 37% were waiting to receive access by 1998. Networked resources were available in the library media centers in 87% of the elementary schools, in student labs in 56% of the schools, and in at least some classrooms in 70% of the schools. Since 1993, this special education funding from the Georgia lottery has enabled schools to implement some technologies, such as satellite dish installation, distance learning capabilities, and networked resources, sooner than would have been possible without such appropriations. The study also indicates the critical importance of maintaining adequate and dependable educational funding from local and state government sources for the continued use of advanced telecommunications and computer technologies in classroom instruction. A map of Georgia counties and the survey are appended. (Contains 47 references.) (Author)

ADVANCED TELECOMMUNICATIONS AND COMPUTER TECHNOLOGIES IN GEORGIA PUBLIC ELEMENTARY SCHOOL LIBRARY MEDIA CENTERS

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ABSTRACT

The purpose of this descriptive study was to determine what recent progress had been made in Georgia public elementary school library media centers regarding access to advanced telecommunications and computer technologies as a result of special funding. Governor Zell Miller of Georgia designated state lottery funds to be used for the improvement of education through implementation of instructional technology beginning in 1993-94. The Georgia state legislature allocated lottery profits to fund specific technological enhancements in education, including automation of school library media centers, networking, video distribution systems, satellite dish installation, distance learning capabilities, and telecommunications for each public school. Georgia's GALILEO (Georgia Library Learning Online) statewide electronic library, made available on the Internet through PeachNet in 1996, was also funded by state lottery appropriations.

This study was based on a 26 percent stratified sample of Georgia's public elementary schools with a response rate of 72 percent. A questionnaire designed by the researcher addressed the following areas: automation and networking of the school library media center and use of video distribution systems, telecommunications and satellite access, faculty development, short-term technology planning, and funding sources for technology. Of the 298 survey questionnaires mailed to elementary library media specialists in January 1997, a total of 214 usable surveys were returned. The survey results are reported in tables showing percentages and frequency of responses.

This study indicates that almost 40 percent of public elementary schools had automated the library media center and 61 percent had implemented a video distribution system prior to 1993-94, which was before this state began using lottery funds for education. Lottery appropriations funded implementation of automated library systems in 51 percent of Georgia's elementary SLMCs, installation of video distribution systems in almost 29 percent and satellite dish installations for distance learning capabilities in 92 percent of the elementary schools. Recent lottery funding has contributed to Internet access in 21 percent of the elementary schools. Internet service was available in 63 percent of the elementary schools, and the remaining 37 percent were waiting to receive Internet access by 1998. Networked resources were available in the library media centers in 87 percent of the elementary schools, in student labs in 56 percent of the schools, and in at least some classrooms in 70 percent of the schools. Since 1993, this special educational funding from the Georgia lottery has enabled schools to implement some technologies, such as satellite dish installation, distance learning capabilities, and networked resources, sooner than would have been possible without such appropriations designated for specific technological implementation in this state. This study also indicates the critical importance of maintaining adequate and dependable educational funding from local and state government sources for the continued use of advanced telecommunications and computer technologies in classroom instruction.

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CHAPTER 1

INTRODUCTION

The purpose of this descriptive study is to determine what recent progress has been made in Georgia public elementary school library media centers regarding access to advanced telecommunications and computer technologies as a result of special funding. Many public schools across the nation are currently using rapidly expanding telecommunications and computer technologies, including automated library systems, CD-ROM databases, computer networking, cable and satellite capabilities, distance learning opportunities, on-line and Internet searching, interactive multimedia software, and media distribution systems. Within the next few years, there will be improved access to digital information through digital video disc (DVD) players showing full-length movies; digital versatile disc (DVD-ROM) drives accessing vast amounts of digitized images, sound, and text; and new compact disc-recordable (CD-R) machines combining the functions of a VCR, audiotape recorder and laser disc player (Sengstack 1996, 50; Wolpin 1995, 32). As early as 1998, high definition television (HDTV) or interactive television (I-TV) will merge the capabilities of various telecommunication providers, including cable, satellite, telephone, and television services (Wolpin 1995, 32). The high cost of maintaining, upgrading and replacing computer hardware and software and the need to continually train teachers and students in the use of new technology requires careful planning and budgeting of money and resources. The implementation of initially expensive equipment

and programs to keep pace with recommended technological advances in hardware and software capabilities for instructional utilization in schools may continue to require additional sources of revenue and special funding.

Individual states have developed school renewal plans that involve the use of advanced technologies in teaching and learning as a result of the 1994 *Goals 2000: Educate America Act* (Vedantham and Breeden 1995, 33). Most states, including Georgia, have utilized federal grants and state funding to help in the implementation of advanced instructional technologies in public schools. Georgia received $2,358,215 in 1994-95 and $8,959,402 in 1995-96 in federal funds for Goals 2000, to be used for school improvement, curriculum revision, teacher training, and integration of technology into classrooms (Malico1996, 1). At the state level, Governor Zell Miller of Georgia designated state lottery funds to be used for the improvement of education through implementation of instructional technology. In 1993-94, Georgia received allocated lottery funds to provide dual-band steerable satellite dishes for all Georgia public schools, public libraries, technical schools, and colleges by the end of 1994 (Allen and Crozier 1994, 73). A total of $12 million was spent on the purchase and installation of satellite dishes in public schools, and $1.9 million was spent on classroom access to distance learning (Georgia Council for School Performance 1995, 52). Each public school in the state was given $1,000 for video distribution and $17,500 for classroom instructional technology (Allen and Crozier 1994, 73). A total of $32.9 million was spent on computers, software, and networking and $1.4 million was spent on technology training centers for teachers (Georgia Council for School Performance 1995, 52). Distance learning opportunities in the areas of Georgia history, science, and foreign languages, as

well as staff development, were made available through each public school's video distribution system located in the school library media center (SLMC). Each school also received $17,500 to automate the SLMC during 1994 (Allen and Crozier 1994, 73). The total amount spent on SLMC automation was $30.7 million (Georgia Council for School Performance 1995, 52). As a result of automation, these media centers have networked computers that provide simultaneous access to online catalogs and other electronic resources. Many Georgia schools also networked computers in the classrooms or in labs for sharing instructional resources (Allen and Crozier 1994, 73).

The Georgia Department of Education received a total of $109,437,478 in 1994 and $93,449,839 in 1995 from Georgia lottery funds allocated for an instructional technology program in public education (Georgia Council for School Performance 1995, 46). The overall goal of the instructional technology program was "to increase student access to meaningful educational opportunities through the utilization of state-of-the-art technology for instruction" (Georgia Council for School Performance 1995, 51). Five goals that were met during 1993-94 and 1994-95 included automated and networked school library media centers; a school-wide video distribution and distance learning system; technology training centers for teachers; additional computers and assistive technology for students with disabilities; and technology-related modifications of schools. Four additional goals to be met from 1996 through 1998 include a lab with twenty-five computers in each school; five networked student workstations and one teacher workstation in each classroom; public library and school connections to the Internet through PeachNet; and a lending library of laptop computers for teachers (Georgia Council for School Performance 1995, 51). Since October 1993, the lottery has

contributed almost $213 million for instructional technology to benefit 1.3 million K-12 public school students in 1,846 Georgia schools (*Governor Miller* 1996, 1; Georgia Council for School Performance 1996, 11). This special technology funding has given public schools in Georgia the means to begin integrating computerized instructional resources into the curriculum and expanding access to advanced technologies.

Purpose

The three purposes of this study of advanced telecommunications and computer technologies in Georgia public elementary schools are: (1) to assess the implementation and present status of SLMC technology, including automation, school networking, telecommunications, satellite programming, and utilization of computer software; (2) to assess on-going faculty development and technology planning; and (3) to identify major sources for technology funding in Georgia schools, determining whether allocated lottery funds for technological implementation have increased the use of advanced instructional technologies in elementary schools and SLMCs since 1993. With Georgia as a case study, this investigation will determine the need for continued federal, state, and district funding, as well as local revenues, to ensure that K-12 schools across the nation have adequate access to advanced telecommunications and computer technologies.

Research questions to be answered from this study of Georgia public elementary schools are as follows:

1. SLMC Automation:

   What percentage of the schools have automated library systems and media distribution systems, and how was the SLMC automated system chosen?

2. Internal Access:

What is the extent of student access to computers, and what percentage of the schools are using curriculum-related software?

3. External Access:

   What type of cabling is used with WAN telecommunications, how many media specialists have access to GALILEO databases, and how many schools use satellite programming for students or for teachers?

4. Internet Access:

   What percentage of the schools have Internet access, and what is the extent of student access to the Internet?

5. Staff Development:

   What building-level methods for faculty development in technology are in use now, and what methods for faculty development will most likely be used in the future?

6. Technology Planning:

   What percentage of the schools have short-term technology plans for hardware enhancement and replacement, and what newly developed software options may be considered for future purchase?

7. Past Funding Sources:

   What percentage of the public schools had certain technologies prior to the establishment of a state lottery fund for education, and what percentage of the schools used state lottery appropriations for achieving these technologies after implementation became state mandated? What other funding sources were used for implementation of these technologies?

8. Future Funding Sources:

   What major sources of funding can be identified for future technological implementation in this state?

CHAPTER 2

REVIEW OF THE LITERATURE

The introduction of microcomputers in the 1980's revolutionized our society. Word processing, financial spreadsheets, database management, and electronic searching became popular in businesses and in higher education. Although computer technology was initially slower to infiltrate K-12 schools and their library media centers, automation and advanced telecommunications are now being promoted nationally as the tools needed in preparing students for the twenty-first century. A review of recent national studies on technology and telecommunications in K-12 schools will indicate the progress being made in the 1990's. The states of Massachusetts, Maryland, and Georgia will be used as examples in statewide networking projects. Several recent Georgia studies will focus on progress made in SLMC automation and access to computer resources.

National Studies

National surveys reporting the use of technology through school library media programs or the use of telecommunications in K-12 schools include a 1992 study of telecommunications used by K-12 educators, 1991-92 and 1993-94 School Library Journal surveys of SLMC programs, a 1993 survey of SLMC use of telecommunications in twelve states, a 1994-95 Quality Education Data study of technology in schools, and annual surveys by the National Center for Educational Statistics (NCES) on school use of advanced telecommunications in 1994, 1995, and 1996. Because school library media

specialists have been instrumental in promoting the use of computer technology in the schools, it is important to know how many of the nation's schools have SLMCs with trained library media specialists. The NCES included questions about school library media centers in its 1990-91 Schools and Staffing Survey (SASS), which surveyed 12,856 public and private schools across the nation. The results revealed that 93.7 percent of the responding schools had library media centers and 98 percent of school students were served by these SLMCs. Although 95.8 percent of public schools had library media centers, 17.9 percent of these SLMCs did not have full- or part-time trained librarians or media specialists. The majority of the SLMCs lacking trained staff were in elementary schools. All reporting schools from Georgia had library media centers, but 1.9 percent had no librarian and 1.1 percent lacked both a librarian and an aide (Lynch 1995, 252; O'Brien, Ingersoff and Rossi 1995, 1-2). In the *SASS by State 1993-94 Schools and Staffing Survey: Selected Results* report, 2 percent of Georgia public schools did not meet AASL and AECT recommended staffing requirements at the elementary school level, and only .1 percent lacked a qualified library media specialist at the secondary level (Bandeira de Mello and Broughman 1996, 166, 172). This 1993-94 SASS report placed Georgia first in the nation for having media specialist involvement in the instructional process as reported by one-third (33.2 percent) of public school teachers (Bandeira de Mello and Broughman 1996, 178, 180).

A national survey of telecommunications used by K-12 educators for professional development and student learning was conducted in 1992 by the National Center for Technology in Education (NCTE). Of the 1,100 educators who initially responded to an online request for volunteers to participate in this study, 550 educators from forty-eight

states completed the lengthy questionnaire (Honey and Henriquez 1993, 2-3). The majority of the schools represented in this survey were in New York, New Jersey, Pennsylvania, Ohio, Indiana, Illinois, Michigan, Wisconsin, California, Oregon, Washington, Alaska, and Hawaii. The geographic distribution revealed a concentration of telecommunications activities in the mid-Atlantic, northern Central, and Pacific regions of the United States (Honey and Henriquez 1993, 4-5). The primary teaching areas of the responding educators included the following (Honey and Henriquez 1993, 7):

23.3 percent	Computer specialists
20.0 percent	Elementary teachers
14.4 percent	Library media specialists
12.7 percent	Science teachers
7.7 percent	Math/Computer science teachers

The majority of these educators had used telecommunications for professional development for at least four years and for student learning activities for at least three years. The most frequently used networks for both professional and student activities were Learning Link, FrEdMail, NASA Space Link, and DIALOG. Two additional networks used for student activities were National Geographic Kids Network and Kidsnet (Honey and Henriquez 1993, 12, 28). Internet access was available to 48 percent of these educators, provided through either a university computer or an educational telecommunications service, such as Learning Link or FrEdMail. The Internet was being used twice as often for professional purposes as it was for student learning projects (Honey and Henriquez 1993, 30-31). The majority of the funding for telecommunications activities came from local school or district funds (Honey and Henriquez 1993, 26-27).

Miller and Shontz reported results of the biennial School Library Journal surveys for 1991-92 and 1993-94, which surveyed school library media programs in U.S. schools

subscribing to SLJ. Between the two studies, computerized circulation systems in SLMCs increased by one-third from 47.3 percent to 64.2 percent, and online computer catalogs in SLMCs almost doubled from 24.3 percent to 46.9 percent. Student access to on-site online database searching via telecommunications also almost doubled from 21.1 percent to 40 percent. The number of schools with SLMC access to fax machines more than doubled from 25 percent to 54.2 percent (Miller and Shontz 1993, 34; 1995, 31). The percentage of schools having additional funding for technology increased, as shown in the following comparison (Miller and Shontz 1993, 34; 1995, 31):

Additional funding for:	1991-92	1993-94
Microcomputer software	25.6 %	38.9 %
Online/telecommunications	7.9 %	21.3 %
CD-ROM	24.2 %	35.5 %
Interactive video	9.9 %	14.4 %
Network activities	not reported	8.1 %

Other technology areas surveyed in 1993-94 showed what percentage of SLMCs were using each technology (Miller and Shontz 1995, 32):

Technology	SLMCs
Local area networks	38.8 %
Wide area networks	44.0 %
Student access to CD-ROM indexes	48.4 %
Student access to CD-ROM encyclopedias	77.7 %
Student access to the Internet or to E-mail	25.0 %

Schools who subscribe to the School Library Journal may be more technologically rich than other schools. Although these SLJ surveys may not be representative of the national population of K-12 schools, they do show the expanding use of telecommunications and computer technologies.

In September of 1993, the American Association of School Librarians (AASL) sent out a small survey to school library media specialists who were members of AASL in

the twelve states of Arkansas, Arizona, California, Illinois, Kansas, Kentucky, Massachusetts, Michigan, Oregon, Pennsylvania, Rhode Island, and West Virginia. Results were gathered from 706 of the 1,318 schools in the sample. More than half of the elementary SLMCs responding from Massachusetts had computers with modems and were using Internet connections. The other eleven states fell below 15 percent in providing school library Internet connections. More than half of the secondary SLMCs responding from seven of the states had computers with modems, and the states of Kansas, Kentucky, and Rhode Island had more than 25 percent of secondary schools with Internet connections (Lynch, Kramer and Weeks 1994, 3, 9).

At the end of 1993, the Bureau of the Census sent a public school library media center questionnaire sponsored by NCES to public and private schools across the nation to gather 1993-94 statistics on SLMC collections, expenditures, technology and services (NCES 1993, 2). The results of the technology section of this survey were not published in time to include in this report. Annual surveys of more than 80 percent of public schools in the United States have been conducted by Quality Education Data (QED) National Education Database from Peterson Publishing Company. Their statistics on new technologies are representative of the national population of K-12 schools. In the spring of 1994, schools reporting use of online services indicated that 24 percent were using the Internet and 14 percent were using other online services, including Prodigy, America Online, AppleLink, and Compuserve (QED 1995, 14). The percentages of schools using CD-ROM technology and local area networks in QED's 1994-95 survey are lower than the ones cited by Miller and Shontz from the 1993-94 SLJ survey, as revealed in the following statistics for schools using new technologies, with a breakdown by level of

schools (QED 1995, 5-12):

New Technologies	Elementary	Middle/Jr. High	High School	All Schools
Cable	73 %	83 %	78 %	74 %
CD-ROM	33 %	45 %	54 %	37 %
Modems	29 %	39 %	51 %	34 %
Local area networks	22 %	32 %	48 %	28 %
Videodisc players	24 %	34 %	34 %	27 %
Satellite dishes	10 %	22 %	37 %	17 %

The 1994 National Information Infrastructure (NII) initiative of the Clinton administration has backed private sector development of telecommunications networks to deliver digital information resources and services to public and private enterprises. Progress toward the federal goal of connecting the nation's hospitals, law enforcement agencies, libraries, schools and classrooms to the Internet has been accelerated as a result of the NII initiative (Heaviside 1997, 2). Because of the rapidly changing status of advanced telecommunications in public elementary and secondary schools, surveys were conducted each fall in 1994, 1995, and 1996 by NCES to collect data on school use of advanced telecommunications. Special education, vocational education, and alternative schools were excluded from these studies (Heaviside 1997, 2). The results revealed that access to the Internet at the school building level increased by 15 percent between each of these studies with access in 35 percent of all schools in 1994, in 50 percent in 1995, and in 65 percent in 1996. The following breakdown by school level shows that fewer elementary schools had Internet access than secondary schools (Heaviside 1997, 3).

Internet Access	1994	1995	1996
Elementary Schools	30 %	46 %	61 %
Secondary Schools	49 %	65 %	77 %

The percentage of schools with Internet access in one instructional room, including a classroom, computer lab, other school lab, or school library media center, was 43 percent

in 1996. Another 26 percent had Internet access in two to four instructional rooms, and 25 percent had access in five or more instructional rooms. Internet access was not available in any instructional rooms in 5 percent of the schools where access was only in administrative areas. Overall, only 3 percent of instructional rooms in public schools had Internet access in 1994, increasing to 8 percent in 1995 and to 14 percent in 1996 (Heaviside 1997, 5). The 1996 survey revealed that 90 percent of the schools using the Internet provided access to the World Wide Web and to e-mail for teachers and administrative staff. Student access to the World Wide Web was provided by 74 percent of the schools and student e-mail was provided by 35 percent of the schools (Heaviside 1997, 7). Of the public schools with no Internet access, 30 percent reported plans to become connected by the year 2000, with 9 percent planning to be connected in 1997 and another 15 percent planning to be connected in 1998. Only 5 percent of public schools reported no plans for future Internet access (Heaviside 1997, 6-7).

Distance learning was another use of advanced telecommunications that was also a part of the 1996 NCES study. Distance learning capabilities were used in 22 percent of the public schools, with 19 percent for elementary schools and 33 percent for secondary schools (Heaviside 1997, 8). Funding for advanced telecommunications, including the Internet, came mainly from local school districts in 83 percent of the schools and additional funding came from state or federal sources in 38 percent of the schools (Heaviside 1997, 10). Parents or other community members contributed technology funds in 18 percent of the schools and business or industry contributed technology funds in 10 percent of the schools (Heaviside 1997, 12). These surveys contain the most recent national statistics on advanced computer technologies in K-12 schools.

Statewide Networking Projects

Almost all fifty states now have organizations that provide telecommunication services or technology support to schools (Woronov 1994, 15). The states of Massachusetts, Maryland, and Georgia will be used as examples of what some states have done in establishing statewide telecommunications for educational and governmental purposes. In Massachusetts, a national satellite network transmits courses for students and for faculty development through the Mass Learn Pike, provided by the Massachusetts Corporation for Educational Telecommunications (MCET). This organization also operates a computer network for Internet access to the schools (Woronov 1994, 15). Beginning in 1994, school administrators were given dial-up access to the Internet through LearnNet. In 1997, all teachers will have the opportunity to register for a toll-free Internet account, and over the next two years, high speed Internet access will be provided to all schools in Massachusetts (Antonucci 1996, 2). The estimated cost for this telecommunications access will be $1,000 per month per school, for a total of $20 million per year to be funded by the state (Nadeau and Louie 1997, 2). The high level of state funding indicates a strong commitment to education in order to provide on-going Internet access for instructional purposes.

The state of Maryland has established a statewide telecommunications network called Sailor to connect the public to the Internet through libraries and schools. This telecommunications network became publicly available in July 1994 through the Enoch Pratt Free Library in Baltimore, provided by the University of Maryland's telecommunication system. The service was implemented through *The Seymour Plan: Electronically Connecting Maryland's Libraries*, funded by LSCA grants and sustained

by state funds (Smith 1996, 2). It has grown to include all 24 county public library systems in the state. Internet use began with free Gopher service. The Sailor web page was begun in June 1995 (Smith 1996, 1). A virtual union catalog is now being developed to search all online public catalogs simultaneously (Smith 1996, 4). Schools can access the K-12 Community Listserve, bulletin board, and a discussion forum for educators. Library media specialists and teachers use the state's telecommunication system to access needed information and complete various classroom projects. The state has provided awareness training for librarians and other educators, as well as in-depth training of master library media specialists and public librarians who then provide additional training in their local regions (Null 1994, 2-3). Maryland has made a commitment, not only in providing Internet access, but also in providing on-going training in its use for instructional purposes within the educational environment.

Georgia's PeachNet, the data communications network of the University System of Georgia, is the backbone of the state's telecommunications educational information system which began in 1988. This network connects Georgia's higher education institutions, public libraries, and K-12 schools. PeachNet provides access to the Internet, including Gopher, World Wide Web, and FTP, through its connection to SURAnet, a branch of NSFNET (University System of Georgia 1996, 1). Access to all of the University System libraries, most private colleges and universities, and the State Archives is made possible through the Georgia State University library automation system. EduNET at Georgia College serves K-12 educators through PeachNet, providing e-mail, electronic conferences and in-service training, and allows the exchange of curriculum materials. PeachNet can also be used to access NovaNet at the University of Illinois for

computerized instruction, e-mail, and discussion groups for students (University System of Georgia 1996, 1). To improve the state's telecommunications infrastructure by expanding ISDN and Frame Relay services to rural areas of the state, local community initiatives were promoted through the "Ring Around Georgia" project from October 1994 through mid-January 1996. This telecommunications infrastructure planning project was made possible by a federal grant from the National Telecommunications and Information Administration Telecommunications and Information Infrastructure Program (NTIA TIIP) and matching funds from the University System of Georgia Board of Regents and the Georgia Department of Administrative Services (Georgia Center for Advanced Telecommunications and Technology 1996, 1).

In February 1995, a proposal for a statewide electronic library through PeachNet was approved by the Georgia General Assembly and Governor Zell Miller to be funded with state lottery funds. In September 1996, this statewide electronic library called GALILEO, "Georgia Library Learning Online," was introduced with access to two databases, ABI Inform and Periodical Abstracts. GALILEO now provides access to more than 1200 Georgia government documents, reference sources such as Encyclopedia Britannica Online, and over 11,000 periodicals through 125 bibliographic and full-text databases, including Academic Press journals, Cambridge databases, Current Contents, FirstSearch OCLC databases, GaleNet databases, and UMI databases (Williams 1997, 1-2; GALILEO 1997, 1-4) . As part of the GALILEO initiative, all thirty-four University System libraries now have online catalogs, as well as additional computers and printers for use with GALILEO. The general public has access to Georgia government publications, state census data and the Georgia Libraries Journal List on GALILEO.

Currently, full access to GALILEO databases is available to all students and faculty of the University System of Georgia through assigned passwords. Georgia public libraries are gaining access to GALILEO databases in 1997, and K-12 schools in the state will be given access by 1998 (*Lottery* n.d., 1). The goal is to have GALILEO information resources accessible to any Georgia resident who desires access. Georgia's commitment in providing statewide electronic access to government documents, extensive periodical literature, and reference materials, both to the educational community and to the local citizenry, is commendable.

Georgia Studies

Several Georgia studies and reports have shown the progress of school library media center automation and access to K-12 computer resources in the early 1990's. Statistics from the Georgia Department of Education indicated that prior to 1991, less than one percent of school library media centers were automated throughout the entire state; however, within this small percentage, every SLMC in seven of Georgia's county school systems had been automated (Meghabghab 1994, 222).

In January 1992, Baggett surveyed media specialists in half of Georgia's public secondary schools to determine the level of SLMC automation and how it was being funded. The findings revealed that 38.1 percent of the schools had both automated circulation and online catalog systems, 9.4 percent had an automated circulation system only, and 1.4 percent had an online catalog only. CD-ROM programs were being used by 33.8 percent of the schools, and online database searching was being used by 14.3 percent (Baggett 1992, 26). More than three-fourths of the funding for automation came from tax sources. Local and state funds for SLMC automation, CD-ROM programs, and online

databases were used by 70.5 to 72 percent of the schools and federal funds were used by 11.8 to 16 percent of the schools. Multiple funding sources were used by 5.9 to 11.8 percent, and only 4 to 5.8 percent of all funding was obtained from non-tax sources (Baggett 1992, 26-29). Meghabghab surveyed 497 Georgia library media specialists in 1993 to identify several trends in library automation in this state. These trends included the automation of all library media centers regardless of collection size or school enrollment, priorities of automating circulation first and then cataloging and public access, use of fully integrated and networkable automated systems to include networking with CD-ROM databases, and preference of Novell networks with IBM-compatible equipment (Meghabghab 1994, 229).

In January 1993, Auerbach surveyed 132 public and private high school library media specialists in Georgia to assess the impact of computer-based technology on the high school library media program. The results of this survey showed that "computer-based technology had the greatest impact on the high school media program by providing increased access to more information" (Auerbach 1993, v). Computers with CD-ROM drives were being used in almost three-fourths of the high school media centers (Auerbach 1993, 35). A CD-ROM magazine index and electronic encyclopedia were being used by 50 to 60 percent of these schools respectively (Auerbach 1993, 27). This survey also revealed that schools in northern Georgia were utilizing twice as much technology than central or southern Georgia schools in the areas of online databases, local area networks, and CD-ROM magazine indexes (Auerbach 1993, 30-31). The funding for technology in high schools came from local system or state funds for 87 percent of the responses and from federal funds for 47 percent of the responses (Auerbach 1993, 25).

Kurk's 1993 survey of high school media specialists in the five-county region surrounding Atlanta studied how the SLMC budget was being used for print, non-print, and technology resources. The results revealed that 83.9 percent of these high schools were using technology to access information and that an average of 23.5 percent of the 1991-92 SLMC budget had been used for technology purchases (Kurk 1993, 46-47). Pickard surveyed secondary school library media specialists in the metropolitan Atlanta area of DeKalb County in 1991 and again in 1994. The first survey concerned the use of DIALOG database searching, which had been available in the media centers since 1989. The results revealed that students were being taught to search online and they were given assistance in obtaining materials cited in searches. The second survey concerned the use of recently acquired Internet/e-mail technology through Solinet (Southeastern Library Network). This survey revealed that half of the media specialists were not using the Internet because of time pressure created by the implementation of state-mandated automation of the media centers at that time (Pickard 1995, 198-9). These Georgia studies reveal slow progress in the use of computer technology and SLMC automation prior to 1993.

In 1996, the Georgia Council for School Performance surveyed 112 elementary and secondary schools located throughout Georgia to determine the impact of lottery funding on instructional technology. The results revealed that over a three year period from 1993-94 to 1995-96, the average expenditure for technology was $66,817 per school, including model technology schools, with 54.3 percent of this total provided from lottery funds (Georgia Council for School Performance 1996, 18). For the 1996 fiscal year, the following amounts were spent on technology (Georgia Council for School

Performance 1996, 16):

Technology FY '96	Amount Spent	Funded by Lottery
Computer Software	$ 7,087	35 %
Computer Hardware	$38,407	35 %
Networking	$21,622	51 %
Technology Equipment/Supplies	$11,606	77 %

Availability of technology in classrooms increased after 1993 as a result of lottery funding, especially for classroom computers, networked computers, and classroom distance learning capabilities, as shown in the following comparison (Georgia Council for School Performance 1996, 4):

Technology in Classrooms	1992-93	1995-96
Stationary Computers	26.0 %	62.0 %
Networked Computers	2.0 %	41.0 %
Distance Learning Capabilities	15.0 %	49.0 %
Stationary Televisions	62.0 %	72.0 %
Telephones	5.0 %	11.0 %
Modems	0.5 %	3.6 %

As a result of lottery funding, the average number of computers per classroom doubled from 1.1 to 2.2 and the average number of students per computer dropped more than half from 28 to 13 (Georgia Council for School Performance 1996, 12). More computers are available for student use in high schools, where the ratio is 8 students per computer, than are available in elementary schools, where the ratio is 20 students per computer. A difference in the number of computers per classroom was also evident by school level. The ratio for high schools is 2.7 computers per classroom, whereas the ratio for elementary schools is 1.8 computers per classroom. With the state divided into five regions, schools in the southern, north central, and west central counties had fewer computers per classroom than the northern and east central counties of the state, as indicated in the following regional comparison (Georgia Council for School Performance

1966, 16-17):

Computers per Classroom by Region

South (Lower 35 counties)	1.6 computers
North Central (33 counties)	1.7 computers
West Central (35 counties)	2.0 computers
East Central (26 counties)	2.6 computers
North (Upper 30 counties)	2.8 computers

Although all schools had satellite dish access, a lower percentage of high school classrooms were equipped with distance learning capabilities than middle school or elementary classrooms. In most of the schools, the automated library media center was "the hub of technology use," being able to access greater amounts of information and to do research more quickly (Georgia Council for School Performance 1996, 19-20). Recent special funding to increase access to computer technologies in Georgia schools has greatly helped this state move forward in school reform since 1993.

The national status of automation and networking of K-12 schools and their library media centers indicates that prior to the late 1980's, little progress had been made on the elementary school level. Secondary schools were more likely to have computerized access to materials and information than elementary schools. Although a semester course in computer science became a graduation requirement for high school students in the mid-1980's, computers were not being widely integrated into the school curriculum. In 1994, national educational guidelines for *Goals 2000* required states to develop school renewal plans that included the use of technology (Conte 1995, 933). Attention was focused on the need for greater computerized access to information, including the Internet, and the integration of resources into major curriculum areas. Many states made financial commitments to achieve greater progress in the use of computer technologies and telecommunications in schools. Their achievements are noteworthy, as

shown in the examples of Massachusetts, Maryland, and Georgia. Technological implementation in Georgia public elementary schools was studied to ascertain how much has been achieved in recent years and what progress was made possible through federal or state-mandated educational goals.

Georgia SLMC automation progressed from one percent of K-12 schools prior to 1991 to half of the secondary schools by 1992. In 1993-94, SLMC automation was mandated by the state for all public schools. How were the automation systems chosen? How many elementary SLMCs were automated prior to 1993-94 and how was this automation funded? Past studies of Georgia high schools have shown the use of CD-ROMs, computer programs, and other technologies in the SLMCs. How much curriculum-related software and other technologies are Georgia elementary schools using? National studies of the use of advanced telecommunications in K-12 schools show what percentage of schools have access to the Internet and what applications are being used by students. How do Georgia elementary schools compare with national statistics? Past funding for technological advances has come mainly from tax revenues. How much have recent lottery appropriations impacted access to advanced technologies in elementary schools? What funding sources are likely to be used for technological innovations in the future? A 1997 survey of Georgia public elementary schools is needed to verify the recent progress that has been made in the use of advanced telecommunications and computer technologies and how this progress has been funded.

CHAPTER 3

METHODOLOGY

For this descriptive study the survey method was chosen to assess the current status of technology implemented in Georgia public elementary schools through 1996. A questionnaire designed by the researcher was mailed to randomly selected elementary library media specialists in 26 percent of Georgia public elementary schools. The survey addressed the following factors:

1. Extent of computer technologies presently employed through public school library media centers, including automated library systems, networking capabilities, and availability of curriculum-related software.

2. Utilization of telecommunications for access to online databases and the Internet, and access to distance education programming by satellite.

3. Methods used for faculty development at the building level, including in-service workshops, faculty meetings, and lab sessions.

4. Short-term technology planning, including upgrading or replacing existing computers, adding new types of hardware and software for better access to digital information, and phasing out older hardware as it becomes outdated.

5. Sources of funding for technological implementation, including school funds from fundraisers or the P.T.A., local district or county funds, state lottery appropriations or other state funds, federal funds, and private funds or grants.

The survey questionnaire was divided into four sections. The first section consisted of demographic questions, including area population, grade levels of the school, student enrollment, and the previous year's technology revenues. The second section consisted of questions concerning automation and networking of the school library media center, including availability of curriculum-related software, video distribution systems, and major technology funding sources for SLMC automation and video distribution systems. The third section consisted of questions about telecommunications and satellite programming, including Internet access and distance learning, and major technology funding sources for implementation of satellite access and the Internet. The fourth section consisted of questions related to faculty development, short-term technology planning, and future funding sources for technology. See the appendix for a copy of the questionnaire.

The survey was limited to elementary schools because they were identified in the literature as having had the least access to computer technologies in the past. Private schools were omitted from this study because they did not benefit from most federal or state funding for implementation of computer technologies.

The survey was used to reveal the extent of technological progress that has been made in public elementary schools throughout the state in recent years. For this study, the state of Georgia was arbitrarily divided into upper and lower regions by the researcher for comparison purposes. The upper region consisted of sixty-five counties or 41 percent of the total number of counties, and the lower region consisted of ninety-four counties or 59 percent of the total number of counties.

The public schools surveyed were randomly selected from the Georgia Education

Directory 1997, with one out of every five public elementary schools selected, omitting special entities. To ensure that one elementary school from each public school system was included in the sample, the first public elementary school listed in the Georgia Education Directory for any school system that had been omitted in the original random selection was then selected. This method, which added another six percent of the schools, allowed one public school to be included from an additional 69 school systems, giving a total of one school from 143 school systems, two or three schools from 26 school systems, and four or more schools from the remaining eleven largest school systems in Georgia. The total sample included 298 of over 1,100 elementary schools listed in the state directory.

Validity of the survey instrument was partially assessed by field-testing in December of 1996 by five middle school media specialists from Chatham County, and after some revision, the survey instrument was again field-tested in early January of 1997 by five elementary school media specialists from Chatham County. The final survey was mailed on January 23, 1997. To keep track of the respondents, each survey was numbered in the upper right-hand corner. Those who did not respond within two weeks were sent post card reminders. By mid-February, 168 surveys were returned, two of which were unusable. Then the survey was sent again to the 130 non-respondents. By March 20, a total of 216 surveys had been returned. The final response rate was 71.8 percent for 214 usable surveys, representing 19 percent of the public elementary schools in Georgia. In order to determine whether non-respondents might be significantly different from respondents, a series of comparisons were made of early and late respondents. These comparisons on selected variables showed no statistically significant

differences. Characteristics of the late respondents are therefore similar to characteristics of the early respondents. Methodological studies have shown that late respondents share the same characteristics as non-respondents (Babbie 1995, 260). Therefore, it can be concluded that even if the response rate had approached one-hundred percent, these findings would not be significantly different.

Regional survey results were compared to determine any differences in current implementation of technology. The statistical data was tabulated into percentages and frequency of responses for ease of comparison. The WINKS statistical package, version 4.21, was used to analyze and compare the data. The sixth edition of Turabian's A Manual for Writers of Term Papers, Theses, and Dissertations was followed for the format of the research paper and the open style tables.

CHAPTER 4

RESULTS

This study of advanced instructional technologies in Georgia public elementary schools had three purposes: (1) to assess the implementation and present status of SLMC technology, including automation, school networking, telecommunications, satellite programming, and utilization of computer software; (2) to assess on-going faculty development and technology planning; and (3) to identify major sources for technology funding in Georgia schools, determining whether allocated lottery funds for technological implementation have increased the use of advanced instructional technologies in elementary schools and SLMCs since 1993.

Demographics

Of the 298 survey questionnaires mailed, a total of 216 were returned, but two were not usable. The final response rate was 71.8 percent. The first section of the questionnaire consisted of demographic questions regarding school location, area population, size of school and grade levels taught. These questions identify the geographic areas and the schools represented in the sample. For comparison purposes, the state of Georgia was divided into two regions with 65 counties (41 percent) in the upper region and 94 counties (59 percent) in the lower region. The upper region, which has the largest population, had 173 schools in the sample (58 percent), and the lower region, which has the most rural areas, had 125 schools in the sample (42 percent).

Table 1 shows the survey respondents by state region.

Table 1. Survey Respondents by State Region

State Region	Schools Surveyed (26 %)	Respondents (71.8%)
Upper: 65 counties	173 (58.1 %)	133 (62.1 %)
Lower: 94 counties	125 (41.9 %)	81 (37.9 %)
Total	298 (100 %)	214 (100 %)

Tables 2 and 3 show whether one or more schools were selected per school district. All 180 school districts in the state were included in the sample, and three-fourths of these school districts had at least one responding school included in this study. Of the school districts with only one school in the sample, twelve counties (19 percent) in the upper region and thirty-two counties (34 percent) in the lower region failed to return a completed questionnaire. Only one school was chosen from each of the 52 small school districts in the upper region. The remaining 121 schools were from larger upper region school districts with two or more schools randomly selected. Only one school was chosen from each of the 91 small school districts in the lower region. The remaining 34 schools were from larger lower region school districts with two or more schools randomly selected.

Table 4 shows the area population by region. A comparison of the area population in each region indicated that 65.4 percent of upper region schools were in medium to large areas, and 67.9 percent of lower region schools were in small areas.

Table 2. Number of Small School Districts with One School Selected

State Region	Small School Districts Sample (48 %)	Small School Districts Respondents (46.3 %)
Upper	52 (36 %)	41 (41.4 %)
Lower	91 (64 %)	58 (58.6 %)
Total Schools	143 (100 %)	99 (100 %)

Table 3. Number of Larger School Districts with Multiple Schools Selected

State Region	Larger School Districts Sample (52 %)	Larger School Districts Respondents (53.7 %)
Upper	121 (36 %)	92 (41.4 %)
Lower	34 (64 %)	23 (58.6 %)
Total Schools	155 (100 %)	115 (100 %)

Table 4. Respondents by Area Population and by Region

Area Population	Upper Region n = 133	Lower Region n = 81	Total n = 214
Large Area: 100,000+	34 (25.6 %)	12 (14.8 %)	46 (21.5 %)
Medium Area: 99,999-	53 (39.8 %)	14 (7.3 %)	67 (31.3 %)
Small Area: 25,000-	46 (34.6 %)	55 (67.9 %)	101 (47.2 %)

Table 5 shows the type of school location from inner city or city to town or rural. Inner city schools represented only 7.9 percent of the total respondents, with 8.3 percent in the upper region and 7.4 percent in the lower region. Each region had about 31 percent of schools in towns. With a greater number of schools in smaller school districts located in the lower region, 43 percent of responding schools from this region were in rural areas. With a greater number of schools in large school districts located in the upper region, 44 percent of responding schools from this region were in cities or inner cities.

Table 5. Respondents by Type of School Location and by Region

Type of School Location	Upper Region n = 133	Lower Region n = 81	Total n = 214
Inner City	11 (8.3 %)	6 (7.4 %)	17 (7.94 %)
City	48 (36.1 %)	15 (18.5 %)	63 (29.44 %)
Town	42 (31.6 %)	25 (30.9 %)	67 (31.31 %)
Rural	32 (24.0 %)	35 (43.2 %)	67 (31.31 %)

The analysis of these demographic statistics in Tables 1 through 5 show the diversity between the two regions of the state, regarding the size of the school districts, area population, and type of school location. The upper portion of the state, which has larger cities and contains eight of the eleven largest school systems, including the Atlanta metropolitan area, is more densely populated than the lower portion of the state. Although the lower region included more counties, it contained more rural areas with

smaller school systems. The great difference between the overall population of each region helps to explain the difference in the regional response rates. The demographic characteristics of the responding schools aids in understanding the regional results found in the study.

Table 6 shows the beginning and ending grade levels in the responding schools. Most of the schools surveyed contained kindergarten through grade five. Kindergarten was the beginning level in 86 percent of all responding schools, and grade five or six was the ending level in 84 percent of the schools. Primary schools for kindergarten through second or third grade comprised less than 5 percent of the total, and schools ending with grades seven, eight, or twelve comprised 10 percent of the total.

Table 6. Respondents by Beginning and Ending Grade Levels

Beginning Grade Level	Total n = 214	Ending Grade Level	Total n = 214
Pre-K or K	184 (86.0%)	Grades 2, 3, 4	12 (5.6%)
Grade 1 or 2	3 (1.4%)	Grade 5	158 (73.8%)
Grade 3	22 (10.3%)	Grade 6	22 (10.3%)
Grade 4	5 (2.3%)	Grade 7 or 8	15 (7.0%)
		Grade 12	7 (3.3%)

Table 7 categorizes the student enrollment of responding schools. The enrollment in 77 percent of the schools was between 301 and 900 students, with 74

percent of these schools in the lower region and 81 percent in the upper region. In each region, fifty percent of the schools had an enrollment of 600 or less, and 16 percent of the schools had an enrollment of more than 900 students. One K-5 school in the lower region had more than 1500 students. School size and grade levels of the responding schools did not differ much between the regions.

Table 7. Respondents by Student Enrollment and by Region

Student Enrollment	Upper Region n = 133	Lower Region n = 80	Total n = 213
300 or less	12 (9.0 %)	2 (2.5 %)	14 (6.6 %)
301 to 600	54 (40.6 %)	38 (47.5 %)	92 (43.2 %)
601 to 900	45 (33.8 %)	27 (33.7 %)	72 (33.8 %)
901 to 1200	19 (14.3 %)	9 (11.3 %)	28 (13.1 %)
1201 or more	3 (2.3 %)	4 (5.0 %)	7 (3.3 %)

A full-time library media specialist worked in 95.8 percent of the responding schools, and two media specialists worked in six very large schools (2.8 percent). A half-time media specialist worked in three small schools (1.4 percent). Non-professional assistance was directly related to the size of the school enrollment. No assistant or clerk worked in the smallest schools, a part-time or full-time assistant/clerk worked in 77 percent of medium to large schools, and two or three assistants/clerks worked in the very largest schools. Table 8 indicates the percentages for SLMC non-professional staffing.

Table 8. SLMC Non-Professional Assistants for Respondents
Number of Schools = 214

Clerk 0	Clerk .5	Clerk 1	Clerk 1.5 to 3
34 (16 %)	30 (14 %)	134 (62.6 %)	16 (7.4 %)

Tables 9 and 10 show the 1995-96 SLMC revenues available for materials and technology and the percent used for computer-related technology expenditures in 1995-96. The SLMC revenues for materials and technology were under $10,000 for 39.5 percent of the schools or between $10,000 and $20,000 for another 39.5 percent, totaling 79 percent of the schools, with little difference between regions. Revenues exceeded $60,000 for materials and technology in seven schools in the upper region and one school in the lower region (3.8 percent). Three of these upper region schools were new and three had large local bond referendums for technology in 1995-96.

The percentage of the 1995-96 SLMC revenues spent on computer-related technology was over 80 percent in the seven upper region schools (3.4 percent) that exceeded $60,000 for materials and technology. Almost half of the SLMCs (47.1 percent) spent 20 percent or less of these revenues on computer-related technology. In fifteen schools (7.3 percent), none of the SLMC revenues was used for technology because all technology funding was provided separately from the library media center. This analysis indicates that 40 percent of the SLMCs had less than $10,000 and another 40 percent had between $10,000 and $20,000 in revenues designated for both materials and technology expenditures in 1995-96. Almost half of the SLMCs (47 percent) used

less than 20 percent of their materials and technology budget for technology-related hardware and software expenditures, and another 20 percent of the SLMCs used 20 to 40

Table 9. 1995-96 SLMC Revenues

SLMC Revenues for Materials & Technology	Schools n = 210	Percent
Under $10,000	83	(39.5 %)
$10,001-20,000	83	(39.5 %)
$20,001-40,000	30	(14.3 %)
$40,001-60,000	6	(2.9 %)
Over $60,000	8	(3.8 %)

Table 10. 1995-96 SLMC Technology Expenditures

Percent of Revenues for Tech Expenditures	Schools n = 206	Percent
None	15	(7.3 %)
01%-20%	97	(47.1 %)
21%-40%	42	(20.4 %)
41%-60%	29	(14.0 %)
61%-80%	16	(7.8 %)
Over 80%	7	(3.4 %)

percent of the SLMC revenues for technology-related purchases. These findings indicate the critical need for additional revenues designated to fund technology in the schools.

Research Question 1: SLMC Automation

What percentage of Georgia public elementary schools have automated library systems and media distribution systems, and how was the SLMC automated system chosen? Section two of the questionnaire, "Automation and Networking of the SLMC," was used to answer this research question.

Schools having both an automated catalog and automated circulation system comprised 95 percent of the respondents, as shown in Table 11. Two schools in the lower region and four schools in the upper region were not yet using automated systems because they were still involved in the conversion process. Four other upper region schools were using either an automated catalog or an automated circulation system only.

Table 11. Automation of SLMC by Region

Extent of SLMC Automation	Upper Region n = 133	Lower Region n = 80	Total n = 213
Both Systems	125 (94.0 %)	78 (97.5 %)	203 (95.3 %)
Circ or Catalog	4 (3.0 %)	0	4 (1.9 %)
Not automated	4 (3.0 %)	2 (2.5 %)	6 (2.8 %)

Table 12 shows how the SLMC automated systems were selected. Responsibility for selecting the SLMC automation system was given to the local school district in 75 percent of upper region schools and in 50 percent of lower region schools. The SLMC or Media Specialist was given this responsibility in 17 percent of upper region schools and in 40 percent of lower region schools. The remaining schools indicated that either a committee of media specialists or a combination of local school and district coordinators were responsible for selection.

Table 12. Responsibility for SLMC System Selection

Responsibility for System Selection	Upper Region n = 127	Lower Region n = 78	Total n = 205
Local School District	95 (74.8 %)	39 (50.0 %)	134 (65.4 %)
SLMC Media Specialist	22 (17.3 %)	31 (39.7 %)	53 (25.8 %)
Committee/Combination	10 (7.9 %)	8 (10.3 %)	18 (8.8 %)

A video distribution system was present in 89.6 percent of the 211 responding schools. It was not yet implemented in the remaining 10.4 percent, with little difference between upper and lower regions. Table 13 displays the percentage of schools using video distribution systems located in the SLMC for access to videos, cable TV, broadcast TV, or satellite programming. As shown in the table, not all of the respondents answered the questions regarding types of media being distributed through these systems.

Table 13. Use of Video Distribution Systems
n = 211

Type of Media	In Use	Not in Use	No Response
Videos	173 (82.0 %)	11 (5.2 %)	27 (12.8 %)
Cable TV	151 (71.6 %)	19 (9.0 %)	41 (19.4 %)
Broadcast TV	135 (64.0 %)	27 (12.8 %)	49 (23.2 %)
Satellite programs	176 (83.4 %)	13 (6.2 %)	22 (10.4 %)

Research Question 2: Internal Access

What is the extent of student access to computers, and what percentage of the schools are using curriculum-related software? Section two of the questionnaire, "Automation and Networking of the SLMC," was used to answer this research question.

A total of 200 respondents listed the number of school computers available for student use, from a low of eight in a school with over 300 students to a high of 400 computers in a new school with over 900 students. Networked computers on a LAN or WAN were indicated in 86 percent of the schools, with the number ranging from a low of two in a school that was preparing to network all classrooms to a high of 265 in another school that had all classrooms already networked. No computers were networked in 14 percent of the schools. Table 14 summarizes the availability of computers and the number networked for student use. Table 15 compares SLMC, lab, and classroom access to networked resources within the schools by region. No classrooms were networked in about 30 percent of the schools.

Table 14. Computers Available and Networked for Student Use

Number of Computers	Schools n = 200	Number Networked	Schools n = 185
8 to 50	73 (36.5 %)	2 to 35	91 (49.2 %)
51 to 100	83 (41.5 %)	36 to 75	58 (31.3 %)
101 to 400	44 (22.0 %)	76 to 265	36 (19.5 %)

Table 15. Networked Resources by Region

Networked Resources	Upper Region n = 132	Lower Region n = 77	Total n = 209
SLMC	109 (84.5 %)	72 (90.0 %)	181 (86.6 %)
Student Labs	65 (50.4 %)	52 (66.7 %)	117 (56.5 %)
Some Classes	23 (17.4 %)	19 (24.7 %)	42 (20.1 %)
Most Classes	27 (20.4 %)	19 (24.7 %)	46 (22.0 %)
All Classes	41 (31.1 %)	18 (23.4 %)	59 (28.2 %)
No Classes	41 (31.1 %)	21 (27.2 %)	62 (29.7 %)

Networked resources were available in the SLMC in 86.6 percent of the schools. Only 10 percent of lower region schools and 16 percent of upper region schools had no SLMC networked resources. Networked resources were available in student labs in 56.5 percent of the schools. Two-thirds of the schools in the lower region and half of the

schools in the upper region had networked labs. Many of the remaining schools indicated that there were no student labs. Networked resources were available in either some, most or all classrooms in 70 percent of the schools.

Curriculum-related software on CD-ROM or computer disks that were being utilized through the SLMC were divided into ten categories: encyclopedias, magazines, newspapers, current issues or topics, reading tests, history or social studies, literary or language arts, math, science, and miscellaneous. The respondents were asked to give the number of titles in each of these categories to allow comparison of the number of different programs by categories. They were also asked to indicate how many of these programs were networked. Tables 16 through 19 summarize these findings.

Tables 16 and 17 show statistics for general software categories by format. Almost all of the responding schools (92.5 percent) were using electronic encyclopedias in the SLMC. One-third of the schools were using at least one networked encyclopedia.

Table 16. SLMC Software by Format
Number of Schools = 200

Software Programs	Quantity 1-2	Quantity 3 +	Total
Encyclopedias	90 (45.0 %)	95 (47.5 %)	185 (92.5 %)
Magazines	57 (28.5 %)	0	57 (28.5%)
Newspapers	9 (4.5 %)	0	9 (4.5 %)
Current Topics	12 (6.0 %)	5 (2.5 %)	17 (8.5 %)
Reading Tests	82 (41.0 %)	20 (10.0 %)	102 (51.0 %)

About half of the schools (51 percent) were using a networked reading program, such as *Accelerated Reader*, and 28.5 percent of the schools had a magazine database. Because some magazine databases include newspapers, it was not surprising to find a separate newspaper database being used by less than 5 percent of the schools. Databases of current issues or social topics were present in 8.5 percent of the schools.

Table 17. Networking of SLMC Software by Format
Number of Schools = 200

Software Programs	Quantity 1	Quantity 2+	Total
Encyclopedias	46 (23.0 %)	19 (9.5 %)	65 (32.5 %)
Magazines	34 (17.0 %)	0	34 (17.0 %)
Newspapers	2 (1.0 %)	0	2 (1.0 %)
Current Topics	3 (1.5 %)	1 (.5 %)	4 (2.0 %)
Reading Tests	51 (25.5 %)	19 (9.5 %)	70 (35.0%)

Tables 18 and 19 show statistics for major subject-area software. In the four major subject-area categories, more than half of the schools indicated having one to twenty or more programs in each area: social studies (55 percent), language arts (64 percent), mathematics (53 percent), and science (59.5 percent), with miscellaneous programs in one-third of the schools (32 percent). The majority of these schools were using ten or fewer programs in each area, and one-sixth of the schools were networking one to five programs. There was little difference in regional comparisons for software.

Table 18. SLMC Software by Subject
Number of Schools = 200

Software Programs	Quantity 1-10	Quantity 11-20	Quantity 21 +	Total
Social Studies	81 (45.5%)	12 (6.0%)	7 (3.5%)	110 (55.0%)
Language Arts	86 (43.0%)	18 (9.0%)	24 (12.0%)	128 (64.0%)
Mathematics	79 (39.5%)	10 (5.0%)	17 (8.5%)	106 (53.0%)
Science	95 (47.5%)	16 (8.0%)	8 (4.0%)	119 (59.5%)
Miscellaneous	54 (27.0%)	2 (1.0%)	8 (4.0%)	64 (32.0%)

Table 19. Networking of SLMC Software by Subject
Number of Schools = 200

Software Programs	Quantity 1-2	Quantity 3-5	Quantity 6 +	Total
Social Studies	20 (10.0 %)	12 (6.0 %)	0	32 (16.0 %)
Language Arts	17 (8.5 %)	19 (9.5 %)	14 (7.0 %)	50 (25.0 %)
Mathematics	19 (9.5 %)	16 (8.0 %)	10 (5.0 %)	45 (22.5 %)
Science	23 (11.5 %)	8 (4.0 %)	2 (1.0 %)	33 (16.5 %)
Miscellaneous	13 (6.5 %)	11 (5.5 %)	6 (3.0 %)	30 (15.0 %)

Research Question 3: External Access

What type of cabling is used with WAN telecommunications, how many media

specialists have access to GALILEO databases, and how many schools are using satellite programming for students or for teachers? Section three of the questionnaire, "Telecommunications & Satellite," and the first question of section four, "Faculty Development," were used to answer this research question.

The type of cabling being used for Wide Area Network communications was not known by half of the respondents. Almost one-third of the schools in each region used either twisted-pair cable or coaxial cable. In the upper region, one school had a wireless system and two schools used an ISDN line. Fiber optic cable was indicated by 12 percent of the responding schools, with another 2 percent using fiber optics as a backbone between buildings. Table 20 summarizes statistics for the type of cabling being used.

Table 20. Cabling for Wide Area Network Communications
Number of Schools = 177

Twisted-pair Cabling	Coaxial Cabling	Fiber Optic Cabling	Other Cabling	Cabling Unknown
28 (15.8%)	29 (16.4%)	25 (14.1%)	7 (4.0%)	88 (49.7%)

GALILEO database searching was available to seven lower region media specialists and fifteen upper region media specialists who searched weekly, monthly, or quarterly to fill informational needs. However, most of the media specialists were waiting to receive full access to GALILEO's databases without having to be a registered user through a local university. A satellite dish had been installed in all of the responding schools. Distance education courses via satellite were being utilized by students in 35

percent of these schools, with 45 percent in the lower region and 29 percent in the upper region. Distance learning had been used for staff development instruction in almost half of these schools in both regions. Table 21 shows the use of satellite dish access for distance education.

Table 21. Use of Satellite Dish Access for Distance Education
Number of Schools = 206

Satellite Dish Access	Distance Ed for Students	Distance Ed for Staff
206 (100 %)	72 (35 %)	96 (46 %)

Research Question 4: Internet Access

What percentage of these schools have Internet access, and what is the extent of student access to the Internet? Section three of the questionnaire, "Telecommunications and Satellite," was used to answer this research question.

Internet access was not available in about one-third of the 208 responding schools (36.5 percent). Of the 132 schools with access (63.5 percent), more than two-thirds (70.5 percent) of upper region schools and only half (52 percent) of lower region schools had Internet service. Some schools had just received Internet service or would be gaining access during the 1996-97 school year. See Table 22 for schools with and without access.

Of the 132 schools using the Internet, access was limited to one computer in the majority of the schools (71 percent). The Internet could be accessed from two to ten computers in almost one-fourth of the schools. In the upper region, eight schools (6

Table 22. Internet Access by Region in All Elementary Schools

Internet Access	Upper Region n = 129	Lower Region n = 79	Total n = 208
With Access	91 (70.5 %)	41 (51.9 %)	132 (63.5 %)
Without Access	38 (29.5 %)	38 (48.1 %)	76 (36.5 %)

percent) had more than ten computers with Internet access. In each region, the majority of the 122 responding schools (84 percent) had from one to ten teachers using the Internet. Three schools in the upper region had up to fifty teachers using the Internet. Tables 23 and 24 show the number of Internet computers and the faculty using them.

Table 23. Computers Accessing the Internet in Schools with Service

Number of Computers	Schools n = 132
1	94 (71.2 %)
2 to 10	30 (22.7 %)
11 to 115	8 (6.1 %)

Table 24. Faculty Using the Internet in Schools with Service

Number of Faculty	Schools n = 122
1 to 10	103 (84.4 %)
11 to 36	16 (13.1 %)
37 to 50	3 (2.5 %)

Table 25 summarizes location of Internet access within the schools by region for the 132 schools with Internet service. Internet access was available in the SLMC in all but six of the schools. Regionally, 98 percent of upper region SLMCs and 90 percent of

lower region SLMCs had Internet service. Internet access in some, most, or all classrooms was available in 17 percent of the schools, with the same percentage of student labs using the Internet.

Table 25. Location of Internet Access by Region in Schools with Service

Internet Access	Upper Region n = 91	Lower Region n = 41	Total n = 132
SLMC	89 (97.8 %)	37 (90.2 %)	126 (95.4 %)
Student Labs	16 (17.5 %)	7 (17.1 %)	23 (17.4 %)
Some Classes	6 (6.6 %)	8 (19.5 %)	14 (10.6 %)
Most Classes	3 (3.3 %)	2 (4.9 %)	5 (3.8 %)
All Classes	4 (4.4 %)	0	4 (3.0 %)
No Classes	78 (85.7 %)	31 (75.6 %)	109 (82.6 %)

Table 26 shows regional differences for current student use of the Internet. Of the 132 schools with Internet service, student access was not being implemented by some of the schools at the present time. Students had access to the World Wide Web in more than half of the schools (55 percent) and to electronic mail in 31 percent of the schools. Only a small percentage of elementary schools gave students access to database searching, bulletin board services or news groups. The schools that recently acquired Internet service are planning to implement student access as soon as teachers have been trained.

Table 26. Student Use of Internet Applications by Region in Schools with Service

Internet Application	Upper Region n = 91	Lower Region n = 41	Total n = 132
World Wide Web	51 (56.0 %)	22 (53.6 %)	73 (55.3 %)
Daily/Weekly	32 (35.1 %)	13 (31.7 %)	45 (34.1 %)
Bi-M/Monthly	19 (20.9 %)	9 (21.9 %)	28 (21.2 %)
Electronic-Mail	26 (28.6 %)	15 (36.5 %)	41 (31.1 %)
Daily/Weekly	14 (15.4 %)	8 (19.5 %)	22 (16.7 %)
Bi-M/Monthly	12 (13.2 %)	7 (17.0 %)	19 (14.4 %)
Database Access	16 (17.6 %)	6 (14.6 %)	22 (16.7 %)
Daily/Weekly	7 (7.7 %)	3 (7.3 %)	10 (7.6 %)
Bi-M/Monthly	9 (9.9 %)	3 (7.3 %)	12 (9.1 %)
BBS or News	11 (12.1 %)	7 (17.0 %)	18 (13.6 %)
Daily/Weekly	3 (3.3 %)	6 (14.6 %)	9 (6.8 %)
Bi-M/Monthly	8 (8.8 %)	1 (2.4 %)	9 (6.8 %)

Research Question 5: Staff Development

What building-level methods for faculty development in technology are being used now, and what methods for faculty development are being planned for use in the near future? The first part of section three of the questionnaire on "Faculty Development" was used to answer this research question.

Having in-service workshops was the major building-level method for faculty development currently being used by 76 percent of the schools and was either likely or most likely to be used again in 94 percent of the schools. Having faculty meetings was the second major building-level method either likely or most likely to be used again in 71 percent of the schools. Almost half of the schools (48 percent) chose lab sessions and

almost one-third of the schools (31 percent) chose distance learning as either likely or most likely to be used for continuing faculty development. Table 27 shows the methods being planned for the next one to two years.

Table 27. Building-Level Methods Planned for Faculty Development
Number of Schools = 206

Faculty Development	Least Likely	Likely	Most Likely
In-service Workshop	5 (2.4 %)	28 (13.6 %)	166 (80.6 %)
Faculty Lab Sessions	40 (19.4 %)	67 (32.5 %)	31 (15.1 %)
Faculty Meetings	18 (8.7 %)	72 (34.9 %)	75 (36.4 %)
Distance Learning	56 (27.2 %)	52 (25.2 %)	12 (5.8 %)

Research Question 6: Technology Planning

What percentage of the schools have short-term technology plans for hardware enhancement and replacement, and what newly developed software options may be considered for future purchase? Section three of the questionnaire on "Technology Planning" was used to answer this research question.

Three-fourths of the responding schools indicated having short-term technology plans for hardware upgrade modifications for at least a few computers during the next two years. Half of the responding schools had plans for replacement of a few older computers. Many of the remaining schools that did not indicate plans to replace computers were planning to add more computers, especially in classrooms. No more than

1 to 50 computers were targeted for upgrading or replacement, except for six schools who planned to upgrade 55 to 90 computers and four other schools who planned to upgrade 100 to 200 computers. See Table 28 for a summary of short-term plans for computer upgrades or replacements.

Table 28. Planning Upgrade Modification or Replacement of Computers

Computer Upgrades	Schools n = 166	Computer Replacement	Schools n = 166
None	41 (24.7 %)	None	81 (48.8 %)
1 to 10	70 (42.2 %)	1 to 10	57 (34.3 %)
11 to 50	45 (27.1 %)	11 to 50	28 (16.9 %)
51 to 200	10 (6.0 %)		

Short-term plans to phase out older technologies or to add newer technologies during the next two years were not indicated on a large scale, as indicated in Tables 29 and 30. Regarding older technologies, three-fourths of the responding schools were not planning to phase out older laser disc players, VCRs, CD players, or CD-ROM drives during the next two years. These technologies, as well as laser disc players, were listed as likely or most likely to be phased out by only seven schools (3.7 percent). Use of cassette players was the only older technology that was likely or most likely to be phased out over the next two years by almost one-third of the schools (29.5 percent). See Table 29 for a summary of short-term plans to phase out older technologies.

Table 29. Phasing Out Older Technologies
Number of Schools = 186

Older Technologies	Least Likely	Likely	Most Likely
Cassette Tape Players	20 (10.7 %)	20 (10.7 %)	35 (18.8 %)
Laser Disc Players	22 (11.8 %)	6 (3.2 %)	1 (.5 %)
VCR Players	37 (19.9 %)	4 (2.1 %)	3 (1.6 %)
CD Players	35 (18.8 %)	3 (1.6 %)	4 (2.1 %)
CD-ROM Drives	35 (18.8 %)	2 (1.1 %)	5 (2.6 %)

Table 30. Acquiring Newer Technologies
Number of Schools = 186

Newer Technologies	Least Likely	Likely	Most Likely
Dual DVD Players	20 (10.7 %)	12 (6.5 %)	11 (5.9 %)
Dual DVD-ROM Players	23 (12.4 %)	20 (10.7 %)	10 (5.4 %)
CD-Recordable Players	16 (8.6 %)	33 (17.7 %)	30 (16.1 %)
Multi-Laser Disc Players	16 (8.6 %)	30 (16.1 %)	40 (21.5 %)

Regarding newer technologies, three-fourths of the schools (74 percent) were not planning to add newer technologies for the use of digital versatile discs or DVD-ROM discs during the next two years. These two technologies were listed as either likely or most likely to be added by 12 to 16 percent of the schools respectively. More than half

of the schools (55 percent) had no plans to add CD-Recordable players for the use of CDs, audiotapes, videos and laser discs, or multi-laser disc players for the use of laser discs, CDs and the newer digital discs during the next two years. CD-Recordable players and multi-laser disc players were either likely or most likely to be added by at least one-third of the schools (34 to 37 percent). A few schools indicated that they were already using multi-laser disc players. See Table 30 for a summary of short-term plans to add newer technologies.

Research Question 7: Past Funding Sources

What percentage of the public schools had certain technologies prior to the establishment of a state lottery fund for education, and what percentage of the schools used state lottery appropriations for achieving these technologies after implementation became state mandated? What other funding sources were used for implementation of these technologies? Four questions regarding dates of implementation and four funding questions in sections two and three of the questionnaire, "Automation and Networking of the SLMC" and "Telecommunications and Satellite" were used to answer this research question.

Four technologies for K-12 schools that were mandated by the state after the establishment of a state lottery education fund in 1993 were automation of school library media centers, installation of video distribution systems, access to Internet service, and installation of satellite dishes for distance learning capabilities. Almost 40 percent of the responding schools had automated the library media center prior to 1993-94. A video distribution system was implemented in 61 percent of the schools prior to 1993-94.

Almost 11 percent of the schools had Internet access prior to or during 1993-94. Installation of satellite dish access took place in 8 percent of the schools prior to 1993-94. Table 31 shows the implementation of these four technologies by date.

Table 31. Implementation of Technologies by Date

School Year 1993-94	SLMC Automation n = 207	Video Distribution n = 189	Internet Access n = 131	Satellite Dish n = 206
Before	82 (39.6 %)	115 (60.9 %)	4 (3.1 %)	16 (7.8 %)
During	68 (32.9 %)	28 (14.8 %)	10 (7.6 %)	98 (47.6 %)
After	57 (27.5 %)	46 (24.3 %)	117 (89.3 %)	92 (44.6 %)

Table 32 shows the funding sources used to implement each of the four technologies. State lottery education funding was used by 50.7 percent of the public elementary schools for SLMC automation. The second largest funding source for SLMC automation was local district or county funds, which were used by almost one-third of the schools (31.4 percent). Other state funds or federal funds were used for automation by only 14.5 percent of the schools. Satellite dish installation and distance learning capabilities were almost completely funded by state lottery appropriations in 92.2 percent of the schools. Other state funds, county funds or local district funds were used for satellite dish access by only 7.3 percent of the schools.

State lottery funds were used for video distribution systems by more than one-fourth of the schools (28.6 percent). The largest funding source for video distribution

systems came from local district or county funds in 40.2 percent of the schools. Other state funds or federal funds were used by one-fourth of the schools (25.4 percent), almost matching the lottery funding. Finally, state lottery funds were used for implementing Internet access in only 21.4 percent of the schools. Again, the largest funding source for implementation of Internet access was local district or county funds used by 42.7 percent of the schools. Private funds or private grants were used for establishing Internet service by 18.3 percent of the schools, almost matching the lottery funding. School funds were used for this purpose by another 11.5 percent. See Table 32 for major funding sources.

Table 32. Major Funding for Past Technological Implementation

Funding Sources	SLMC Automation n = 207	Video Distribution n = 189	Internet Access n = 131	Satellite Dish n = 206
State Lottery Funds	105 (50.7%)	54 (28.6%)	28 (21.4%)	190 (92.2%)
Local District/County	65 (31.4%)	76 (40.2%)	56 (42.7%)	3 (1.5%)
Other State Funds	19 (9.2%)	34 (18.0%)	6 (4.6%)	12 (5.8%)
Federal Funds	11 (5.3%)	14 (7.4%)	2 (1.5%)	0
School Funds	5 (2.4%)	9 (4.7%)	15 (11.5%)	0
Private Funds/Grants	2 (1.0%)	2 (1.1%)	24 (18.3%)	1 (.5%)

Research Question 8: Future Funding Sources

What major sources of funding can be identified for future technological

implementation in the state of Georgia? Funding categories from section four of the questionnaire on "Future Funding" were used to answer this research question.

Table 33 summarizes the opinions of respondents about future funding sources for technological implementation as they were ranked by the respondents. State lottery funds for future technological implementation were designated as either most likely or likely by 93.7 percent of the schools. School funds and other state funds were also viewed as

Table 33. Future Funding for Technological Implementation
Number of Schools = 207

Funding Sources	Least Likely	Likely	Most Likely
State Lottery Funds	4 (1.9 %)	36 (17.4 %)	158 (76.3 %)
School Funds	30 (14.5 %)	73 (35.3 %)	42 (20.3 %)
Other State Funds	31 (15.0 %)	68 (32.9 %)	34 (16.4 %)
Federal Funds	37 (17.8 %)	60 (29.0 %)	28 (13.5 %)
Local District/County	18 (8.7 %)	25 (12.1 %)	40 (19.3 %)
Private Funds/Grants	54 (26.1 %)	37 (17.9 %)	14 (6.7 %)

likely major sources for future funding by half of the schools. Federal funds were ranked fourth as a good source of future funding by 42.5 percent of the schools. Although local district or county funds had been a major source for technological implementation in the past, less than one-third of the schools (31.4 percent) ranked district and county funds as an expected source of future funding. Also, one-fourth of the schools (24.6 percent) viewed private funds or private grants as an expected source of future funding.

These eight research questions have covered the statistical analysis of the data collected for this study. Major findings are summarized in the final chapter of this report.

CHAPTER 5

CONCLUSION

Georgia has been making steady progress in implementing computer technologies and electronic resources in the public schools using traditional tax sources in the 1990's. In 1993, the Georgia state legislature allocated a percentage of lottery profits to fund specific technological enhancements in education. These enhancements included automation of school library media centers, networking, video distribution systems, satellite dish installation, distance learning capabilities, and telecommunications for each school. Automation of the SLMC and video distribution systems were two technologies already in place in many of Georgia's public schools before this state began using lottery funds for education. Almost 40 percent of the elementary schools, according to this study, and 58 percent of the high schools, according to Auerbach's 1993 study, had automated their library media centers prior to 1993-94, using mainly local district or county funds supplemented by state or federal funds. Almost two-thirds of the elementary schools with an enrollment of more than 900 students and about one-third with an enrollment between 300 and 900 had automated the media center. A video distribution system was implemented in 61 percent of the public elementary schools prior to 1993-94, using mainly local district, county, or state funds. Almost half of the schools with an enrollment of less than 600 students and almost two-thirds with an enrollment of more than 600 students had a video distribution system. Only 8 percent of elementary

schools had installed a satellite dish and implemented distance learning prior to 1993-94, using mainly state funds. Of the elementary schools with telecommunications for Internet access, almost 11 percent received access prior to state lottery implementation, using funding from the local district or county.

State mandates for satellite dish installation, SLMC automation and networking, and video distribution systems in the schools received funding from Georgia lottery appropriations beginning in 1993-94. Lottery appropriations funded satellite dish installations for distance learning capabilities in 92 percent of Georgia's elementary schools, implementation of automated library systems in 51 percent of Georgia's elementary SLMCs, and installation of video distribution systems in almost 29 percent of elementary schools. Recent lottery funding has contributed to Internet access in 21 percent of the elementary schools, and was almost matched by private funds or grants (18 percent), showing a trend toward gaining support from private sources for the use of advanced telecommunications. Since 1993, this special funding from the Georgia lottery has enabled schools to implement some technologies, such as satellite dish installation and distance learning capabilities, sooner than would have been possible without such appropriations designated for specific technological implementation.

As a result of tax funding sources and state lottery appropriations, targeted technologies are now widely used in Georgia public schools. Automated library systems are in operation in 97 percent of Georgia public elementary schools, and the remaining 3 percent are in the process of automating. A video distribution system is in operation in 90 percent of Georgia public elementary schools, with the remaining 10 percent waiting for implementation. Satellite dish access for the use of distance learning is now possible

in all of the public schools. Internet service is available in 63 percent of the elementary schools, and the remaining 37 percent will receive Internet access during 1997 or 1998. Of the schools presently using the Internet, 95 percent of the SLMCs have Internet access.

In regard to future planning and staff development, this study shows that 75 percent of Georgia public elementary schools indicated having short-term technology plans for hardware enhancement or replacement, and 96 percent of the respondents ranked methods used for on-going faculty development. Only four building-level methods for faculty development in technology were surveyed. Use of in-service workshops was the major method currently being used by 76 percent of the schools and likely to be used in the future by 94 percent of the schools. Instruction given in faculty meetings was the second major method for faculty development likely to be used again in 71 percent of the schools. Use of lab sessions was identified by almost half of the schools (48 percent), and distance learning instruction was identified by almost one-third of the schools (31 percent) as likely to be used again for continuing faculty development. The lower rating for distance education instruction may be based on the initial difficulties that were encountered in using this newly established method. Another means of faculty development in technology is the use of technology training centers, which have been recently established throughout the state as a result of lottery funding.

Lottery appropriations were identified as the most likely major source for funding future technological implementation by 94 percent of the responding schools. Almost 50 percent of the schools indicated that other state funds were a likely major source, and almost 56 percent indicated that school funds were a likely major source of future funding. Local county or district funds were a major source of past technological

implementation; however, these funds were viewed as a likely source of future funding by only 31 percent of the schools. This lower rating may indicate a concern that some future revenues would be lost if local taxes decreased. Although private funds or grants were not largely used for past technological implementation, these funds were viewed as a likely source in the future by almost 25 percent of the schools. More business partnerships for technology in the schools are likely to be established to help meet future educational needs.

In 1991-92 Baggett reported that one-third of Georgia secondary schools were using CD-ROMs (Baggett 26, 1992). In 1992-93 Auerbach reported that 60 percent of the high schools were using an electronic encyclopedia and at least one-fourth of these schools were using CD-ROM programs in social science, literature, and science (Auerbach 1993, 26). By comparison, this 1997 survey indicated that 93 percent of the elementary schools are using electronic encyclopedias and more than half of these schools are using CD-ROM and computer resources in language arts (64 percent), science (60 percent), social studies (55 percent), and math (53 percent), confirming that CD-ROM access is still one of the most popular technologies being used in Georgia schools. At least half of the elementary schools (51 percent) are also using a computerized reading program, such as the *Accelerated Reader.*

Networking has become important for the sharing of electronic resources in Georgia public schools. Networked resources are available in the SLMC in 87 percent of the elementary schools and in at least some classrooms for 70 percent of the schools. More than half of the schools (56.5 percent) indicated having student labs with networked resources. Progress is being made toward the current goals of the Georgia Instructional

Technology program to place three to five networked computers in every classroom and at least one student computer lab with access to networked resources in each school.

Regional comparisons indicate a few differences in access to computer technologies and advanced telecommunications across the state. School districts in the lower region of the state, which made up the middle and southern counties in Auerbach's 1993 study, have less access to computer technologies than the upper region. Auerbach's study revealed that high schools in the northern portion of the state were using the most technology, especially modems, online databases, and local area networks (Auerbach 1993, 36). This 1997 study shows that elementary schools in the lower region still have fewer computers in the schools and fewer wide area networks. More technology has been implemented in the school districts in the upper northern counties than in the north central counties of the upper region, as reported in the 1996 study by the Georgia Council for School Performance. The schools in the upper northern counties, with 15 percent of the state's population, had 2.8 computers per classroom, whereas the schools in the north central urban counties, with 49 percent of the state's population, had only 1.7 computers per classroom. In the lower region, the schools in the east and west central counties, with 25 percent of the state's population, averaged 2.3 computers per classroom, whereas the schools in the lower southern rural counties, with 11 percent of the state's population, had only 1.6 computers per classroom (Georgia Council for School Performance 1996, 17, 22,32, 40, 50, 58). In this 1997 survey of elementary schools, almost one-third of upper region schools have networked resources available in all classrooms, as compared to about one-fourth of lower region schools; however, two-thirds of the lower region schools were using networked resources in student labs, as compared to half of the upper region

schools. This difference in the location of computers in the schools has resulted in fewer computers available for student use in lower region schools than in upper region schools. Regional differences were the most obvious in the schools that had access to the Internet. In the upper region, 70 percent of the schools had Internet access, whereas in the lower region, only 52 percent of the schools had Internet access. In regard to school size, Internet access had not been implemented in 50 percent of the smallest schools, in 37 percent of the schools with 300 to 900 students, and in 26 percent of the largest schools. Continued state lottery funding for technology and other sources of funding for school improvement will close the gap on some regional inequities in the school districts.

Satellite dish access is available in all Georgia schools, with about half of the classrooms connected for distance education usage. In 1996, the Georgia Council for School Performance reported that distance education capabilities are available in 70 to 71 percent of the classrooms in the east central counties and the upper northern counties, 51 to 54 percent in the southern rural counties and the west central counties, and only 25 percent of the north central urban counties (Georgia Council for School Performance 1996, 22, 32, 40, 50, 58). In this 1997 study, distance education courses were being utilized by students in 45 percent of the elementary schools in the lower region as compared to only 30 percent of upper region elementary schools. The rural areas, which are predominant in the lower region, have a greater need for distance education opportunities and have been given more classroom access than the urban counties. Overall, distance education courses were being taken by students in 35 percent of the elementary schools, and distance education instruction had been used for staff development in 46 percent of the elementary schools. The Georgia Council for School

Performance indicated that the distance education equipment is hard to use, the programming is not convenient, and subject content needs to be better adapted to the school curriculum (Georgia Council for School Performance 1996, 20). These difficulties help to explain the low usage evident in this study. More funds are needed, not only to place distance education technology in every classroom, but also to allow interactive distance learning capabilities. Decisions concerning what technologies are most needed in each school should be made by individual schools at the district level, where local planning can ensure that the technologies chosen will be incorporated successfully into the curriculum for a greater return on the investment made for school improvement.

The 1996 NCES survey verified that nationally, 61 percent of elementary schools have Internet access (Heaviside 3). From this 1997 survey, 63 percent of Georgia's elementary schools currently have Internet access. The NCES survey showed that Internet access was available in one instructional room, such as the SLMC, in 43 percent of all elementary and secondary schools and in more than one instructional room in 51 percent of all schools nationwide (Heaviside 5). Based on this Georgia study, Internet access is available in the SLMC in 59 percent of all public elementary schools, with one-third of the schools having access in at least some classrooms or in a student lab. At this time in Georgia elementary schools with Internet access, about 5 percent do not have this service available in the SLMC. The nationwide NCES study also indicated that student access to the World Wide Web was provided by three-fourths of all schools and student e-mail was provided by one-third of all schools (Heaviside 7). According to the data presented in this study of Georgia, student access to the World Wide Web is available in

34 percent and student e-mail is available in 19 percent of all public elementary schools. In the Georgia elementary schools with Internet service, student access to the World Wide Web is being utilized in 55 percent and student e-mail is being utilized in 31 percent of the schools. Because Internet access was recently acquired by many of these elementary schools, teachers are currently being trained and implementation of student access has been delayed. In the NCES study, only one-fifth of elementary schools nationally had distance learning capabilities, whereas in Georgia distance learning via satellite is now possible in all public schools in about half of the classrooms (Heaviside 8). The implementation of satellite dish access for distance learning capabilities in Georgia schools was made a priority in this state, funded by lottery appropriations. In this comparison of Georgia elementary schools to the national average in advanced telecommunications capabilities, Georgia has exceeded the national average in all areas, with the exception of current student access to specific Internet applications, such as electronic mail and the World Wide Web.

Elements that are essential in integrating instructional technology into the curriculum are planning, funding, teacher training, and technical support, as concluded in the 1996 Georgia study on the impact of lottery funding on instructional technology (Georgia Council for School Performance 1996, 68-69). The advantages of using technology include individualizing instruction and motivating students to learn, as well as accessing greater amounts of information for assigned activities. Informed planning will enable schools to select computers and other components to utilize newer instructional software. In Georgia almost half of the computers purchased in K-12 schools from 1993 through 1995 were IBM 486s or 486 clones, and 45 percent of these computers were paid

for with lottery funds (Georgia Council for School Performance 1996, 18). Because of rapid changes in technology, schools need to continually upgrade computers and other equipment before they reach obsolescence. The cost of replacing and maintaining equipment needs to be included in funding, along with technical and instructional support. The Georgia Council of School Performance recommends one technical support person for every two schools and one instructional support person to be shared by as many as eight schools. The technical support staff would be on call to maintain, upgrade, repair and trouble-shoot equipment, and the instructional support staff would be scheduled for several weeks of teacher training for better curriculum integration of instructional software at each school. Teachers could also participate in summer "train-the-teacher" workshops in order to provide teacher training to others during the school year (Georgia Council for School Performance 1996, 70-71).

Some possible limitations must be considered regarding the use of state lotteries for funding education. Of the 37 states that have a lottery, only 18 states have specifically designated a portion of the profits for education (Keating 142, 147). Most of the states that designated lottery money for public schools also decreased the amount of tax money in the general fund for education (Keating 144). If lottery money is not appropriated for specific educational benefits, it may be added to the general fund and used to cover budget discrepancies, as has happened in Florida and other states (Keating 145, 147). Nationally, lottery funding for education does not generally include a provision for on-going costs, including hardware and software upgrading and maintenance plans. Public schools must find a way to keep equipment and hardware in good working condition and to fund renewals of database programs or other products in order not to lose the benefits

gained from having greater technological capabilities and resources.

As in any speculative venture, lottery profits are not always a reliable source of on-going revenue, because at any time, the lottery could sustain a shortfall. Concerning profits, states generally keep only one-third of the total proceeds from lotteries. Half of the money is used for prizes and one-sixth is used for operating expenses (Keating 145). Finally, the lottery will not keep taxes from rising. Taxes in lottery states rose three times higher than in non-lottery states from 1990 to 1995, according to a survey by Money Magazine (Keating 144-145). These factors should be seriously weighed by each state that is using a lottery to benefit public education or to alleviate state budget problems. Nationally, 47 percent of the funding for public schools comes from state governments through income taxes or sales taxes, 46 percent comes from city and county governments through local property taxes, and the remaining 7 percent is contributed by the federal government ("Public School Funding" 1997, 10). Additional money for funding the on-going use of computer technologies in the nation's schools could come from an increase in local taxes for this purpose, or from a technology fee paid by parents of school children, or from sponsorship of technology programs by private companies.

The lottery has been successful in Geogia because the Georgia Lottery Corporation pays its profits to the state of Georgia to be used for specific educational enhancements that benefit students in pre-school through college. Also, lottery profits may not be used to replace other funding already established. Georgia legislated three innovative educational programs to be funded with designated lottery appropriations. These funding initiatives were the HOPE (Helping Outstanding Pupils Educationally) Scholarship Fund to pay college tuition for students with a minimum "B" average, the

Pre-Kindergarten Fund for educating four-year-olds on a voluntary basis, and the Instructional Technology Fund and Capital Improvement Fund for public schools, colleges and universities for worthy educational projects (Paul 1996, 6-7).

It is clear that continued federal, state, and local funding, as well as private resources, will be needed to maintain the use of advanced technologies in the nation's schools. The state of Georgia has responded to the challenge to make advanced telecommunications and computer technologies available in all public schools. Technology plans for this state are being carried out systematically to achieve stated goals. This state's investment in public school renewal will give profitable returns in the next century in an informed and skilled citizenry who have had the opportunity to become effective users of ideas and information through the use of advanced telecommunications and computer technologies.

All studies have limitations that should be identified. This study is based on a 26 percent random stratified sample of Georgia's public elementary schools with a response rate of 72 percent. Efforts have been made, using a standard methodology in survey design, to determine that the characteristics of respondents and non-respondents were approximately the same. The respondents represented three-fourths of Georgia's school districts, which included many of the smaller districts across the state. More complete responses regarding technology in the school may have been received if technology coordinators had been surveyed in addition to library media specialists. For comparison purposes, a future study of advanced technologies in Georgia public middle schools for grades six through eight could be done, surveying technology coordinators and media supervisors, as well as library media specialists.

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APPENDIX

January 5, 1997

Jackie Rogers
[address]
Savannah, Georgia

Dear Media Specialist:

In order to complete the requirements for a specialist degree in librarianship at the University of South Carolina, I will be conducting a technology survey of selected Georgia public elementary schools with any combination of grades one through five. Enclosed please find a copy of the questionnaire being pretested and a self-addressed, stamped envelope for your use. Would you please give fifteen minutes of your time to answer all questions as accurately as you can?

The purposes of this study are to assess the implementation and present status of SLMC automation, school networking, and telecommunications; utilization of SLMC computer software; on-going technology planning; and identification of major sources for technology funding in Georgia public schools.

Your response to the enclosed survey is very important to the success of this study. Several local public elementary school media specialists have been asked to pretest the survey instrument. If the directions are not easy to follow, please indicate areas that may be unclear. Also, indicate any problems in understanding the wording of questions or any problems with the adequacy and appropriateness of choices given for answers. Give any other helpful comments or criticisms.

For comparison purposes, Georgia counties have been divided into two regions, upper and lower. *Part I, Question A. (2.) Lower Region* has already been circled for you. For clarification, a copy of a state county map with upper and lower regions marked will be enclosed with the final survey.

Please return the questionnaire within one week in the envelope provided. Your participation is greatly appreciated. Thank you for taking the time from your busy schedule to respond to this survey pretest.

Sincerely,

Jackie Rogers
Media Specialist
Calvary Day School

January 20, 1997

Jackie Rogers
[address]
Savannah, Georgia

Dear Media Specialist:

In order to complete the requirements for a specialist degree in librarianship at the University of South Carolina, I am conducting a technology survey of selected Georgia public elementary schools with any combination of grades one through five. Enclosed please find a copy of the questionnaire and a self-addressed, stamped envelope for your use. Would you please give fifteen minutes of your time to answer all questions as accurately as you can?

The purposes of this study are to assess the implementation and present status of SLMC automation, school networking, and telecommunications; utilization of SLMC computer software; on-going technology planning; and identification of major sources for technology funding in Georgia public schools.

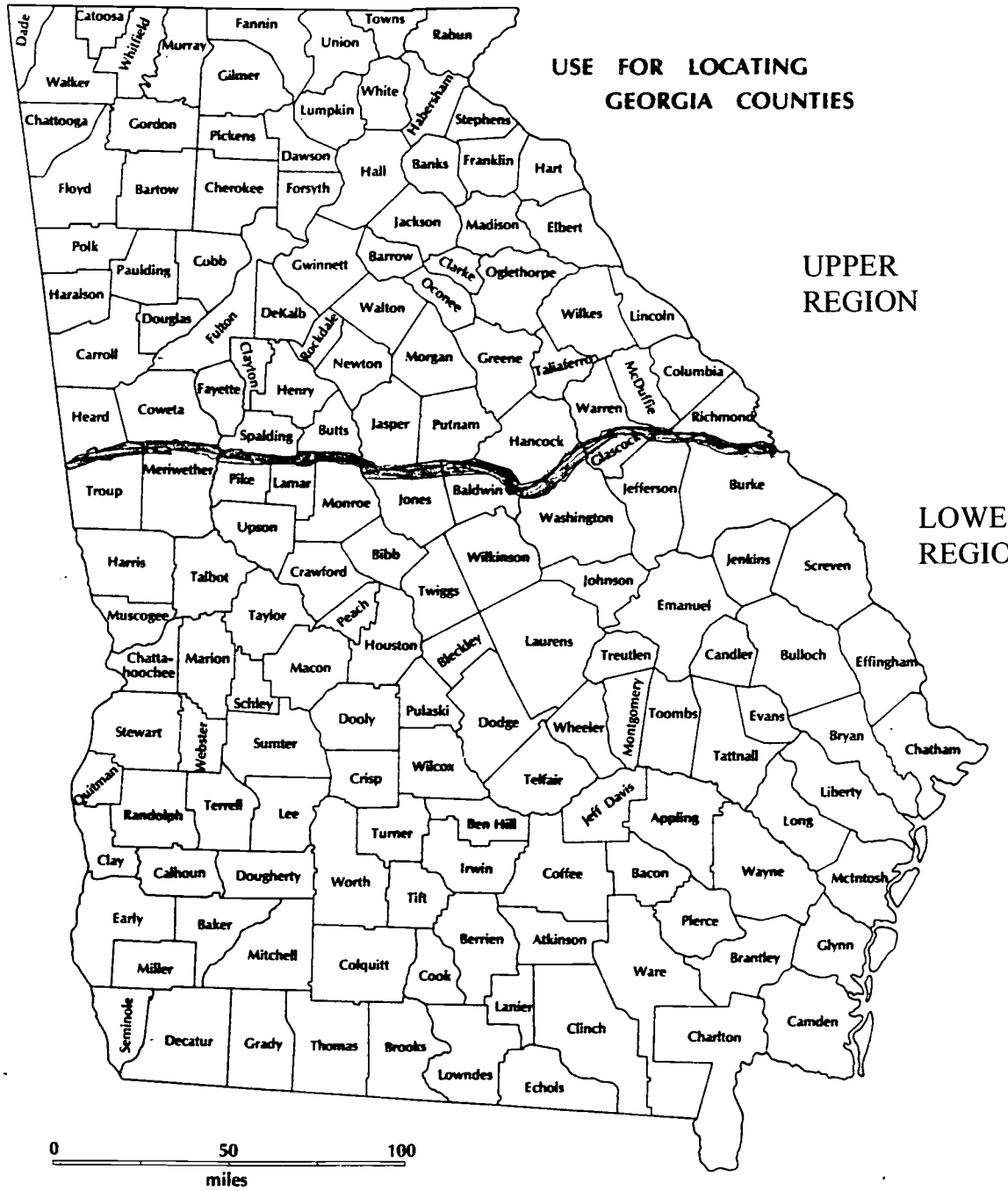
Your response to the enclosed survey is very important to the success of this study and its contribution to our professional literature. You have been selected to represent your school system. One school has been selected from each of 143 Georgia school systems, and two or more schools have been selected from each of the remaining 37 school systems, giving a total of twenty-six percent of Georgia elementary schools.

Please return the survey within one week. Your reply will be confidential. The coding on the questionnaire is for tabulation and follow-up purposes only. Thank you very much for your participation in this study.

Sincerely,

Jackie Rogers
Media Specialist
Calvary Day School

GEORGIA



Georgia Public School Library Media Centers
Survey of Computer Technologies

I. DEMOGRAPHICS: Circle the appropriate response number or supply needed answer as indicated.

A.) According to the enclosed map, indicate whether your county is in the upper or lower region of the state:
(1.) Upper Region (Border: Butts, Carroll, Coweta, Hancock, Heard, Jasper, McDuffie, Putnam, Richmond, Spalding, Warren.)
(2.) Lower Region (Border: Baldwin, Burke, Glascock, Jefferson, Jones, Lamar, Meriwether, Monroe, Pike, Troup, Washington.)

B.) Indicate type of school location: (01.) Inner city (02.) City (03.) Town (04.) Rural

C.) Estimate size of geographic location: (1.) Large area (100,000 population or greater)
(2.) Medium area (25,000 to 99,999 population)
(3.) Small area (Less than 25,000 population)

D.) Indicate the beginning grade level and the ending grade level in your school:

Beginning:			Ending:	
(01.) Pre-K or K	(04.) 3rd grade	*	(07.) 1st grade	(11.) 5th grade
(02.) 1st grade	(05.) 4th grade	*	(08.) 2nd grade	(12.) 6th grade
(03.) 2nd grade	(06.) 5th grade	*	(09.) 3rd grade	(13.) 7th grade
		*	(10.) 4th grade	(14.) 8th grade
				(15.) 12th grade

E.) Give Student enrollment: (1.) 300 or less (4.) 901 to 1200
(2.) 301 to 600 (5.) 1201 to 1500
(3.) 601 to 900 (6.) 1501 to 1800

F.) Give the number of faculty (FTE): _____

G.) Give the number of: (1.) Library Media Specialists (FTE) _____
(2.) LMC Assistants / Clerks (FTE) _____

H.) Estimate the 1995-96 library media center revenues for materials and technology. Include all sources (federal, state, local, other):
(1.) Under $10,000 (4.) $30,001 - $40,000 (7.) Over $60,001
(2.) $10,001 - $20,000 (5.) $40,001 - $50,000
(3.) $20,001 - $30,000 (6.) $50.,001 - $60,000

I.) Estimate the percentage of the revenue figure given above that was spent on computer-related technologies (hardware, software, etc.):
(01.) None (04.) 21% - 30% (07.) 51% - 60% (10.) 81% - 90%
(02.) 1% - 10% (05.) 31% - 40% (08.) 61% - 70% (11.) 91% - 100%
(03.) 11% - 20% (06.) 41% - 50% (09.) 71% - 80%

II. AUTOMATION & NETWORKING OF SLMC: Circle response number or supply answer.

A.) What automated systems have been implemented in the School Library Media Center?
(1.) Both automated Circulation and Catalog systems.
(2.) Automated Circulation only.
(3.) Automated Catalog only.
(4.) SLMC has not been automated (Skip to question II. E.)

B.) When was the SLMC first automated?
(1.) prior to 1993/94 (2.) during 1993/94 (3.) after 1993/94.

C.) What was the major source of funding for implementation of an SLMC automated system? Circle one. (1.) Federal funds. (4.) Local district/County funds.
(2.) State lottery funds. (5.) School funds/PTA/Fund-raisers.
(3.) Other state funds. (6.) Private funds/Private grant.

D.) At what level was responsibility given for selecting the automated system presently in use? (1.) the SLMC (2.) the local school district (3.) Other: _____

E.) How many computers throughout the school are available for student use? _____

F.) How many of these computers have been networked on a LAN or a WAN? _____

G.) Are any networked resources available within the school library media center?
(1.)Yes; (2.) No

H.) Are any networked resources accessible in one or more student computer labs?
(1.) Yes; (2.) No

I.) Are any networked resources accessible in any classrooms?
(1.)Yes, in some classrooms; (2.)Yes, in most classrooms; (3.)Yes, in all classrooms; (4.)No

J.) Estimate the number of curriculum-related software titles on CD-ROM or on computer disks which are being utilized through the SLMC. Also, indicate how many of these titles are presently being networked.

Category:	Total Titles	# Networked
Encyclopedias	(a.) _____	(k.) _____
Magazine databases	(b.) _____	(l.) _____
Newspaper databases	(c.) _____	(m.) _____
Current Issues/Topics	(d.) _____	(n.) _____
History/Social Studies	(e.) _____	(o.) _____
Literary/Language Arts	(f.) _____	(p.) _____
Reading Tests programs	(g.) _____	(q.) _____
Math	(h.) _____	(r.) _____
Science	(I.) _____	(s.) _____
Other (miscellaneous)	(j.) _____	(t.) _____

K). When did the school library media center implement a video distribution system?
(1.) prior to 1993/94 (3.) after 1993/94
(2.) during 1993/94 (4.) not implemented (Skip to question III. A.)

L.) What was the major source of funding for the implementation of a video distribution system? Circle one.

(1.) Federal funds. (4.) Local district/County funds.
(2.) State lottery funds (5.) School funds/PTA/Fund-raisers.
(3.) Other state funds. (6.) Private funds/Private grant.

M.) Are the following types of media being distributed through this video distribution system?

(a.) Videos . . . . . (1) Yes; (2) No __ (c.) Broadcast TV. . . . . (1) Yes; (2) No
(b.) Cable TV. . . (1) Yes; (2) No __ (d.) Satellite dish access . . (1) Yes; (2) No

III. TELECOMMUNICATIONS & SATELLITE: Circle response number or supply needed responses.

A.) What type of cabling was installed for use of WAN telecommunications?

(1.) twisted-pair cable. (3.) ISDN line (5.) wireless. (7.) do not know.
(2.) coaxial cable. (4.) fiber optic cable (6.) other: _____

B.) How often do you search GALILEO databases for curriculum-related information or requested materials? (1.) daily (3.) bi-weekly (5.) quarterly
(2.) weekly (4.) monthly (6.) do not search

C.) If the school has Internet access, when was it first implemented?

(1.) prior to 1993/94 (3.) after 1993/94
(2.) during 1993/94 (4.) not implemented (Skip to question III. K.)

D.) What was the major source of funding for Internet implementation? Circle one.

(1.) Federal funds. (4.) Local district/County funds.
(2.) State lottery funds (5.) School funds/PTA/Fund-raisers.
(3.) Other state funds. (6.) Private funds/Private grant.

E.) How many computers within the school can simultaneously access the Internet? _____

F.) How many teachers are using the Internet or other online services at school? _____

G.) Is Internet access available in the school library media center? (1.) Yes; (2.) No

H.) Is Internet access available in one or more student computer labs? (1.) Yes; (2.) No

I.) Is Internet access available in any classrooms?
(1.)Yes, in some classrooms; (2.)Yes, in most classrooms; (3.)Yes, in all classrooms; (4.)No

J.) How often are the following Internet applications used by students at school?
Use scale: 0 to 4

4 = Daily
3 = Weekly
2 = Bi-Weekly
1 = Monthly
0 = Not Available to Students

(a.) ___ Electronic mail
(b.) ___ WWW (World Wide Web)
(c.) ___ Database access (i.e., Dialog, etc.)
(d.) ___ Bulletin Board Service or News groups
(e.) ___ Other: _____

K.) When was a satellite dish installed in the school?
(1.) prior to 1993/94 (3.) after 1993/94
(2.) during 1993/94 (4.) none installed (Skip to question IV. A.)

L.) What was the major source of funding for a satellite dish? Circle one.
(1.) Federal funds. (4.) Local district/County funds.
(2.) State lottery funds. (5.) School funds/PTA/Fund-raisers.
(3.) Other state funds. (6.) Private funds/Private grant.

M.) Are distance education courses via satellite being utilized by students at school?
(1.) Yes; (2.) No

IV. FACULTY DEVELOPMENT, TECHNOLOGY PLANNING, & FUTURE FUNDING:

A.) Has distance learning programming been used for staff development instruction?
(1.) Yes; (2.) No

B.) What is the major building-level method being used for faculty development? Circle one.
(1.) In-service workshops (3.) Faculty meetings (5.) Other: _____
(2.) Lab sessions (4.) Distance learning

C.) Which methods may be used for faculty development in the next one to two years?
Use Scale: 0 to 3
3 = Most likely
2 = Likely
1 = Least likely
0 = Not planned
___ (a.) In-service workshops
___ (b.) Lab sessions
___ (c.) Faculty meetings
___ (d.) Distance learning
___ (e.) Other: _____

D.) How many computers within the school may be upgraded during the next two years ('97/98-'98/99) to increase or improve RAM or speed or sound or drives, etc.? _____

E.) How many computers within the school may be replaced during the next two years ('97/98-'98/99)? _____

F.) What new technologies may be added within the next two years ('97/98-'98/99)?
Use Scale: 0 to 3
3 = Most likely
2 = Likely
1 = Least likely
0 = Not planned
___ (a.) Dual DVD players for Digital Versatile Discs (DVD) & videos
___ (b.) Dual DVD-ROM players for DVD-ROMs and CD-ROMs
___ (c.) CD-Recordable players for CDs, audiotapes, videos, laser discs
___ (d.) Multi-laser disc players for laser discs, CDs, &newdigital discs
___ (e.) Other: _____

G.) What older technologies may be phased out within the next two years ('97/98-'98/99)?
Use Scale: 0 to 3
3 = Most likely
2 = Likely
1 = Least likely
0 = Not planned
___ (a.) Cassette tape players ___ (d.) CD players
___ (b.) Laser disc players ___ (e.) CD-ROM drives.
___ (c.) VCRs ___ (f.) Other: _____

H.) Which sources may be used for funding future technological implementation?

Use Scale: 0 to 3

3 = Most likely ___ (a.) Federal funds. ___ (e.) School funds/PTA/Fundraiser.
2 = Likely ___ (b.) State lottery funds. ___ (f.) Private funds/Private grant.
1 = Least likely ___ (c.) Other state funds. ___ (g.) Other source (indicate:)
0 = Not planned ___ (d.) Local district/County funds. _____

I.) Please give any further comments that would give insight into any area included in this survey.

_____

_____

_____

Thank you for taking the time to complete and return
this questionnaire for the success of this study!

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