

MOED IT Strategic Plan Brief 2003—2006

Outline

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Mission Statement

B-TEC, a public/private partnership, is building sustained capacity for life-long learning.

We galvanize resources to create dynamic, technology-integrated environments.

This provides opportunities for people to actualize their potential and contribute to our evolving world

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B- Bringing

T- Technology

E- Empower

C- Community

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Executive Summary

“Until a kid gets access to a computer, he or she, is on the wrong side of history”

DONALD TAPSCOTT FROM “GROWING UP DIGITAL”

The Ministry of Education through the BTEC Initiative is committed to ensuring the children of Bermuda have the opportunity to grow up “on the right side of history”. Providing students with early exposure to technology and a rich and engaging learning experience throughout their school career is no longer an option. The future economic strength of Bermuda depends on an educated, IT aware population. If the public education system does not provide this opportunity for students, parents will exercise their options for alternate educational opportunities which they feel will better prepare their children for tomorrow’s work environments. We, therefore, have a duty to ensure the appropriate diffusion of technology in our school system benefits all in Bermuda.

Technology when implemented properly provides the opportunity to revolutionize the teaching experience. The focus becomes one of child learning as opposed to teaching. Some of the areas where technology benefits the education system are:

- School Administration & Teacher Preparation
- Business and Computer Science Studies
- In “regular” classes as a tool to better explain traditional concepts
- To participate in collaborative learning with world experts and students from around the world
- To assist special needs children improve their educational opportunities

Purpose of Plan

This IT Strategic Plan is intended to provide a blue print for how the Ministry can make significant improvements that will create a sustainable technology infused learning environment for Bermuda students. The Plan is not, however, just about education. It also must be seen in a wider context. For as noted in the E Business National Plan, the successful realization of the BTEC Initiative is a significant component in the overall status of Bermuda as the leading offshore e-business jurisdiction

There are four broad themes that are emphasized throughout the Plan:

- the need to increase student access to technology
- the need to increase teachers’ technology proficiency
- the need to create technology infused curriculum
- the need to increase organization capacity to support the use of technology.

These four factors are inseparable, similar the four cornerstones of a building - if any one of them is weak the building will inevitably crumble.

The implementation of this plan relies on several key success factors:

1. Commitment

All partners and stakeholders must be fully committed to the implementation of this Plan. This includes the Government, Professional Staff, Teachers, school administrators, PTAs, parents, private sector businesses, and the public.

2. Funding

It is recognized that the Plan involves substantial funding that will need to be met from both the Government and the private sector. Such funding has to cover the radical investment in infrastructure which this Plan envisages as well as resources to run and maintain it. All sources of funding (including government, private-sector, and PTA) will need to be harnessed and managed collectively to accomplish the goals set-out herein.

3. Teacher Training and Skills Upgrading

All teachers must have a base level of technological proficiency in order to be effective teachers in this millennium. The Ministry must provide the opportunities for professional development, and teachers must take advantage of these opportunities.

4. Core IT Infrastructure

A comprehensive, reliable and efficient IT infrastructure is being implemented, in line with this Plan, throughout the school system. This alone can provide the capabilities for the delivery of a technology infused curriculum. The IT infrastructure involves every classroom in all the public schools having broadband Internet access.

5. Technology Infused Curriculum

The entire existing curriculum base must be reviewed and rewritten where necessary to take advantage of opportunities to infuse technology to provide a more effective, efficient and enriched learning experience.

6. Organizational Capacity

An IT Department must be formed to manage the implementation of this Plan. Current resources dedicated to both the IT Management and Support function and the IT Curriculum Development and Support function are inadequate and significant additional staff will be required.

The plan has been drafted to cover a three year time frame. This timeframe is believed to be appropriate for two primary reasons:

1. Timing Imperative

The need to make significant improvements within 3 years is critical, otherwise another generation of Bermudan students run the risk of graduating with a major disadvantage over their global counterparts. Investment in Bermuda is partly dependant upon a technologically skilled work force; without it our ambitions as laid out in the E Business National Plan will not be realized.

2. Pace of Technological Advancement

Business cycles that were once measured in years are now measured in “internet time”, which is counted in days or weeks. In this environment, planning efforts required to produce accurate technology plans beyond three years are enormous and more often than not unsuccessful.

The three year total cost of this plan is approximately \$25 million dollars which represents an increase from the current budget of approximately \$17.5 million over the same period. The chart below provides the financial summary:

| | Year One | Year Two | Year Three |
|---------------------------------|---------------------|-----------------|-------------------|
| Capital (infrastructure) | 4,009,500 | 2,948,600 | 2,842,400 |
| Operating | 2,619,000 | 3,350,000 | 3,693,000 |
| Non-Infrastructure | 2,101,471 | 2,101,471 | 2,101,471 |
| Total | 8,729,971 | 8,400,071 | 8,636,871 |
| Grand Total | \$25,766,913 | | |

The Critical benchmarks for each year of the Plan are as follows:

- Year 1:** **Classroom Connection** - Complete facilities upgrading with all classrooms at all levels having the capability for network and internet connectivity;
- Year 2:** **Classroom Computing** - Continue infrastructure build with computers in all classrooms from Primary 1 to the end of Senior School connected to the “always on” Internet;
- Year 3:** **Classroom Community** - Complete infrastructure build to provide for sufficient classroom computing at all levels and extend network access to the home and community to provide for parent and community involvement in student learning

Background

The Bermuda Government has a long and commendable history of using computers within the school system. The emphasis, however, in past years has been primarily on adding additional capacity rather than on a radical overhaul of the technology base. This has resulted in inadequate operational budgets and out-of-date technology still in use within many schools.

A primary goal of this Plan is to incorporate adequate IT management and funding to ensure that as new investments are made that the future operational funding is available during the lifetime of the investment and that the investment is automatically evergreened when it becomes out-of-date.

The following is a brief chronology of technology achievements over the past several years:

- 1979 Sandy's Secondary School was the first educational establishment to purchase computers for teacher and student use.
- 1981 Sir John Swan, the premier, established a committee to examine the use of computers in education.
- 1983 PIS Ltd consultants were hired to assist with training and implementation, acquisition of hardware and software.

Mrs. Marva Phillips was hired as first computer coordinator to develop a plan for IT and implement it in the schools.

A series of introductory workshops for teachers was given to ensure that all teachers received instruction in computer literacy.

- 1984 More educational support staff were hired. Computers were put in laboratories in primary and secondary schools.
- 1985 The Writing to Read programme was introduced in all government primary schools.

Computer Steering teachers were identified, one for each school. They were responsible for IT at the building site.

- 1988 The first Technology Plan was developed by persons from all levels of education and the community.
- 1990 Networks and modems began to be implemented in some classrooms
- 1995 BKIN, a wide area network, was implemented to connect middle schools and senior schools

1997 The opening of CedarBridge Academy Senior School, the first fully connected school in Bermuda.

1999 Sandy's Middle School is renovated to add network connectivity throughout the school.

The XL Education Initiative is launched with the goal of developing a world class model for computer science curriculum using the Bermuda Ministry of Education as a partner.

2000 Dellwood Middle School is renovated to add network connectivity throughout the school.

A contract is signed for the position of Chief Information Technology Consultant for the purpose of guiding the Ministry's IT investments and the development of a new IT Strategic Plan for the Ministry.

2001 Spice Valley Middle School is renovated to add network connectivity throughout the school

Construction of the new senior school, Berkeley Institute began and upon its completion in September 2003, will provide network connections through the school.

BTEC, a technology initiative developed out of the XL Education Initiative is launched with the goal of designing and maintaining a state of the art technology programme for the Ministry of Education

2002 TBI Network, a wide area network was implemented in February 2002 to connect senior, middle and primary schools and offer free internet services to schools, courtesy of TeleBermuda Ltd. This network replaced the BKIN network which was implemented in 1995.

Open District administrative network was implemented in February 2002 to provide for centralize reporting of school data and facilitate the exchange of school data between schools. This network included only senior and middle schools. Primary schools connections to this network were completed September 2002.

Phase 1 (networking of computer labs and administrative area) of the primary school cabling project was completed in August 2002. Phase 2 –cabling of classrooms to be completed at a later date.

The "Technology Imperative" for the Bermuda Ministry of Education

Listed below are five reasons why technology remains a critical educational investment.

1. *Technology improves students' learning of basic skills* - the 3 R's. At all levels of instruction, our students are using technology tools to strengthen traditional basic skills. Students now find extensive informational and primary sources quickly. They take risks with their writing, knowing that revision and the production of multiple drafts is simple. They use technology to experiment with mathematics and visualize results. Tedium and repetition has been replaced by discussion, analysis, and better understanding of concepts and applications.
2. *Technology is a new basic skill for the 21st Century*. Our children must be ready for tomorrow's world, where INFORMATION will be the new intellectual currency. We do them a disservice if we do not prepare them with well developed skills for finding, sorting, organizing, and communicating information for a variety of applications. Children must be able to use information and the technology which supports it intelligently and discriminately, and master tools that are still evolving. This requires coaching, practice and access.
3. *Technology belongs in the public schools*. Where, if not the schools, will future citizens learn these skills? Many adults who are well-versed in the traditional basics are novices, at best, with technology. Trained teachers are needed at all levels and in all teaching contexts to cover this new basic so ALL children can learn. An organized program in our public schools, starting at the Primary level, equalizes the playing field for children, and lessens the learning gap between households that are rich with technology versus households where it is absent. Beyond equity, the formal teaching and monitoring of technology tool use also assures that children learn appropriate controls and ethics in their manipulation of information. Knowledge is still power, and carries certain responsibilities. These need to be taught and reinforced in practice.
4. *Technology improves teaching*. Keeping twenty-five children challenged and actively engaged in learning for six or more hours a day is a formidable task, especially when their interests and abilities cover a wide spectrum. Technology, and especially access to the Internet, gives us a positive vehicle to support teachers, in all areas of the curriculum, as they examine and change their instructional style to accommodate such diversity. Used well, technology tools help teachers increase performance standards for the whole group, and enable talented students to soar.
5. *Technology integrates the curriculum with the community*. Technology investments pay back in ways that go beyond the basics. Teachers, students, and community resource people reach contacts throughout the world, to bring living history, science and health, arts, drama (yes, even Shakespeare) into the classroom with riveting

immediacy and impact. Unforgettable learning can result from such powerful encounters! Technology sharpens, energizes, and extends essential content and concepts. As we, the adults, get more comfortable with our own use of the tools, technology might help break down the walls that separate adults from students, teachers from parents, and university resources from public school and community access. Technology, with the full global reach of the Internet, can strengthen community, and ultimately redefine it for the better.

Technology is here to stay. Students, teachers, parents, and community members see it as a critical ingredient for improving the quality of our educational effort.

IT Strategic Planning Process

It is important that IT Strategic Planning is viewed and implemented as an ongoing process rather than the creation of an “IT Strategic Plan” document. This Plan, therefore, should be seen as the essential starting point for the Bermuda Ministry of Education’s ongoing IT Strategic Planning process. By institutionalizing this process the Ministry is ensuring that the Plan remains relevant to changing environmental factors such as educational policy goals, technological advancements, and funding.

Scope of the plan

This plan lays out an IT vision and establishes related IT principles and standards, organization and projects for a three year timeframe. In the IT sector planning beyond a three year timeframe is difficult since the underlying technologies are constantly evolving. The Plan will be updated regularly with a major revision scheduled at the end of the third year.

The plan addresses the forecasted IT requirements for Senior, Middle, Primary, Special Schools and Preschools as well as the Ministry of Education’s administrative sites.

Bermuda Ministry of Education

Mission Statement

The mission of the Government school system is to ensure productive citizens who realize their optimum potential through a first class education system, characterized by exemplary leadership and quality instruction with unified goals and diverse methods, involving all of the community in a commitment to excellence.

Objectives

To ensure that:

1. all students achieve their individual potential as defined by acceptable standards and individual measures;

2. all students will succeed in tertiary education or an endeavour of their choice;
3. all students will graduate

Demographics

| Type of School | # of Schools | # of Students | # of Teachers |
|-----------------------|---------------------|----------------------|----------------------|
| Preschool | 12 | 417 | 56 |
| Primary | 18 | 3342 | 379 |
| Middle | 5 | 1486 | 173 |
| Senior | 2 | 1367 | 181 |
| Special School | 1 | 50 | 6 |
| Totals | 37 | 6662 | 795 |

Information Technology Vision

An education environment within Bermuda where:

- students within ALL schools at ALL levels have equal access to Information Technology resources to assist them in learning ALL subjects
- curriculum is “technology infused” and provides a rich and exciting learning environment for students
- school administration maximizes the use of information technology to provide parental feedback and daily involvement in their children’s education
- information about students is collected and managed effectively and is made available for teachers and education officers (and parents and students where appropriate) to make timely decisions concerning the education of students.

Bermuda’s Ministry of Education is committed to enhancing student learning by using established and evolving technologies to increase productivity, facilitate communication, manage information, inspire creativity, enhance achievement and promote life-long learning throughout the community.

BTEC Vision

Bringing Technology to Empower Community

BTEC Mission Statement

B-TEC, a public/private partnership, is building sustained capacity for life-long learning. We galvanize resources to create dynamic technology integrated environments. This provides opportunities for people to actualize their potential and contribute to our evolving world.

IT Mission Statement

It is the shared belief of the Department of Education that all students including those with special needs, must be prepared for lifelong learning in a highly technical world. To accomplish this goal:

We will equip our teaching staff and learning environments with sufficient and appropriate tools and support to enhance instruction, communication and information management.

Beliefs

Preparation of this Plan is based on the following beliefs as they relate to educational technology.

| | |
|---|--|
| <p>Technology creates new teaching and learning opportunities</p> | <p>Technology encourages fundamentally different forms of interaction between students, teachers, and communities. It contributes to an environment in which teaching and learning move from teacher-centred to learning centred education, from individual tasks to collaborative work, and from passive learning to engaged learning. Technology provides students the means to explore, discover, and construct their own knowledge.</p> |
| <p>Technology provides the means for equitable learning opportunities</p> | <p>Distance learning and other technologies provide a means for a more equitable and varied education for all students, whether in isolated village or in larger city schools. Learners in every community need consistent access to a basic set of technology tools.</p> |
| <p>Technology provides opportunities for collaboration</p> | <p>Technology empowers community members to learn from each other. Technology enlarges the scope of the resources available to learners, including the ability to draw on the strengths of other through distributed learning power. Technology removes the limitations of time and space when collaborating with others. Technology provides a catalyst for interdisciplinary studies and team teaching.</p> |
| <p>Technology provides powerful tools for problem solving</p> | <p>Technology encourages different forms of interactions among students, and between students, teachers and the global community, engaging students systematically in higher-order cognitive tasks. Technology helps students develop inquiry, investigative, and creative problem solving skills that can be applied to real life situations and better enable them to make good decisions. Technology allows students to work on problems which previously out of reach of the school system</p> |
| <p>Accessing, processing and applying information are critical life skills</p> | <p>We recognize that mere access to information is no guarantee that learning will take place. We do know that development of methods to gather information through technology and to organize, synthesize and assimilate that information with the help of the tools of technology must be an important goal in planning the education of our children</p> |
| <p>Technology provides enhanced communication</p> | <p>Staff and students discover and exchange information and knowledge with the larger community, which is</p> |

| | |
|---|---|
| opportunities | comprised of their classroom, school building, local community, school district, and the world |
| Implementing technology is an ongoing process | Technology changes rapidly. The entire community must keep abreast of technological changes that directly effect the learning environment and continue to provide access to relevant tools. |
| People will always have varied levels of technological expertise | People move through a continuum of technology use. Recognizing and providing a means for people to move to ever higher levels of technology use must be a priority of the entire learning community |

Goals and Objectives of Plan

1. **Student Competencies**

Goal: The Department of Education will further develop students' technological skills:

- to enhance their personal and collaborative abilities
- to facilitate making quality decisions and solving problems
- to adapt to the complex technology environments that they will face in their lifetime

Rationale: At the heart of this technology plan lies goals for students. The International Society for Technology in Education has initiated the NETS Project which has a mandate to develop technology performance standards for preschool to secondary students. A collaborative effort between NASA, the United States Department of Education and other technology in education associations, this project seeks to develop milestones that will guide educators in their plans for integrating technology into the curriculum and school management environments. It is designed to provide students “with fundamental technology skills learned through practice in meaningful, real-world settings while developing responsible, ethical attitudes towards technology and learning.” These objectives are consistent with the aims of the Department of Education in preparing our children for the twenty-first century.

Specific Objectives

To adopt policies and develop curricula, procedures and guidelines that ensure that all students:

- acquire skills and knowledge related to the use of technology for enhancing personal and collaborative abilities
- acquire the ability to make decisions related to the use of technology
- acquire skills to work in collaboration with others, with hardware and software and the Internet to solve problems with the support of technology tools
- become responsible and aware users of technology and information
- have access to current technology resources including telecommunications and multimedia enhancements
- acquire skills that prepare them to learn to use new software and hardware technology and to adapt to the complex technology environments that emerge in their lifetime

2. Teacher Competencies

Goal: The Department of Education will further develop students' technological skills by providing technology education and on-going support for teachers.

Rationale: Training in the application of technology skills for all teachers will include: the use of basic productivity tools - word processing, presentation graphics, powerpoint, database, spreadsheet, use of research technologies on CD-ROM and the Internet and e-mail, peripherals at all levels and use of the WinSchool modules where appropriate. It will also include the use of discipline-specific tools such as probes for science experiments. Skill development and integration strategies will be supported in the orientation programme for new teachers and in the staff development programme for all staff. Programme supervision reports will reflect the use of technology in both the management and the instructional categories.

Specific Objectives

- conduct continuous and informal needs assessment through communication with media staff and technology coordinators, teachers, administrators and technology committees
- identify site-based training needs through troubleshooting requests
- determine training needs through formal surveys and focus groups
- design and offer courses and hands-on workshops, specialized to curriculum, level or school
- continue to develop the "train the trainer model," especially in discipline-based training or where specialized tools are required
- offer orientation workshops for new teachers
- offer professional development on media and technology operation and on new hardware and software and other emerging technology
- research and support technology requirements of new instructional and assessment strategies
- plan collaboratively with education officers for discipline-based technology training at all levels, especially that related to new curriculum
- provide training opportunities for support staff to complement the instructional programme and support administrative needs

3. Administrative and Management Services

Goal: To better serve our students, parents and administrative staff, technology will support all administrative services of the Bermuda Government Schools.

Rationale: The use of IT, and particular an administration Intranet for educational resources should make administration tasks more effective and efficient as well as enhancing communications and dialogue for the benefit of all. The school administrative programme (WinSchool) facilitates the flow of information, providing services more efficiently and improving communication amongst departments which service Bermuda's children. WinSchool and Open District modules support the management of academic and health records, facilitate the preparation of reports, create class schedules and electronic gradebooks that are managed by teachers. Continuation of WinSchool training for school personnel is critical.

Specific Objectives

- create an Intranet with security access for all administrative staff
- extend WinSchool access to guidance counselors and attendance officers
- upgrade computers for administrative use
- implement a grading module for primary & middle schools (Chancery's SMS 3.0 solution)
- implement a school management module for preschools so that the statistics can be uploaded
- continue WinSchool and Open District training at all levels

4. Communication and Information Access

Goal: To further develop and expand the Schools Intranet/Internet capabilities so all students have access to always on broadband Internet links in their classrooms

Rationale: Internet connection in the classroom is an essential and integral requirement of the entire plan. It allows the students to benefit from technology diffusion while giving the teachers the technology they need to teach new technology-based curriculum. Access to the global community via the Internet is a valuable resource in the learning experience. Communication and information access are extremely limited (virtually non-existent in the primary schools) and do not reflect the standards that are recommended to prepare our students for their future. Creating an electronic environment requires a commitment to resources, as well as the most efficient use of existing resources. In addition IT Department staff should be afforded the resources to provide leadership and carry out their support duties.

Objectives

- create an IT Department for the management and support of IT resources and curriculum
- extend the wide area network to all schools except preschools
- expand networked resources to libraries, computer labs and classrooms throughout the public school system
- upgrade service when and where appropriate
- maintain accurate inventory of IT resources within the Ministry

5. Instruction and Curriculum**Goals**

1. *Across the Preschool, Primary, Middle and senior curricula, teachers will integrate applications of technology into current instructional programs and assessment strategies.*
2. *The Bermuda Government Schools will provide technology enriched learning environments for all students. These environments will support active, involved and self-directed learning, as well as opportunities for collaborative and cooperative projects, “real-world” problem solving, communication and presentation skills.*

Rationale: The Department of Education must make a significant effort, through staff development, to train teachers to use the tools, instructional software and the networked resources in their daily practice. Local curriculum frameworks reflect the use of technology throughout the learning process and students should engage in a variety of technology experiences throughout the day. Teachers need ongoing training experiences with hardware and time to explore the content of software to build comfort levels with materials and new instructional strategies.

These activities must take place in technology rich learning environments that reliably and adequately provide many avenues for teaching and learning.

Objectives

- increase number of classroom computers
- provide specialized classrooms with appropriate tools and adaptive hardware and software
- upgrade the hardware in computer labs to 25 computers, plus 1 for instructional/demonstration
- provide portable presentation workstations in all schools

- develop portable groups of computers that can be shared between classes at the middle and senior levels
- complete network for Internet and LAN access in instructional areas at primary, middle and senior levels
- provide Internet access in teacher preparation areas
- preview, evaluate and recommend year level, tool or discipline-based software titles and site licenses through a centralized procedure
- liaise with business and community agencies in the development of technology-enriched learning environments.

6. Support

Goal: The Department of Education will ensure a high quality of instruction to students by providing for both technical and curriculum/instruction support to school-based staff and education officers.

Rationale: In order to have an effective IT programme a good support system must be in place. It is vital that hardware is maintained and repairs are done as quickly as possible so that there is little disruption in instruction. To assist the teachers to make paradigms shifts and incorporate best practices, support must be given through in-service, seminars, workshops, etc. In order for effective integration to take place, professional development for teachers is vital. As new technologies emerge, teachers will require regular in-service to take advantage of its value to instruction.

Objectives

- conduct continuous needs assessment through observation, surveys with staff, teachers, administrators and officers
- implement an IT Help Desk function for central reporting and tracking of IT problems and resolutions
- identify site-based training needs through trouble-shooting requests and observations
- continue to develop “train of trainer” model
- adequately staff the IT Department with all IT resources throughout the ministry reporting to head of the IT department, the Chief Information Officer, including senior school IT staff
- develop IT proficiency certification standards for all teachers

- incorporate training for new curriculum with technology applications
- integration of technology into curriculum frameworks, current instructional programmes and assessment strategies
- provide on-going support for teachers through programme supervision

|

Current Status of Technology in Bermuda's Schools

Support Services

Technical

- The current IT organization within the Department of Education has not been able to adequately support the technical requirements of the schools since their prime responsibility is to provide instructional/curriculum support to schools and officers. This has severely hampered the operation of the Technology support team in their assigned duties and the reliability of equipment available to schools.

Curricular Support

Curricular support is given by subject officers as follows:

- Student learning outcomes are identified and opportunities for applying the use of technology to facilitate reaching the goals are explored.
- IT Curriculum Officers of the Curriculum, Instruction & Leadership team, along with subject officers, identify appropriate software.
- Instructional strategies for the software use and necessary professional development for teachers are designed.
- Hardware and supporting peripherals are recommended.

Site Level

- Each primary school has a technology coordinator whose responsibility is to assist the principal with the information technology programme at the site level.
- At the middle level, the business studies teacher assists the principal with monitoring the computer laboratory.
- CedarBridge Academy and The Berkeley Institute have resident technicians on staff.

Staff Training

- The largest obstacle to integrating instructional technologies
- Training has been slow because of the unavailability of teachers during the instructional day
- Ability to use technologies amongst staff members varies greatly
- Some sites have implemented site-based training programmes

Hardware / Software

- Shortage of instructional software in preschool and primary schools
- There is a shortage of computers, especially with CD-ROM at the preschool, primary and middle levels
- Windows-based machines for middle, senior and primary and some Macintosh computers for preschool
- It has been very difficult to fund upgrades of software/hardware and to manage/fund repairs of hardware
- All preschools have at least 2 Macintosh computers and 2 PC computers
- All primary schools have labs equipped with 20 new Networked PC computers
- Internet access for primary schools is currently limited to computer labs and administrative office
- Computers are available in special programme classrooms, with adaptive hardware, where needed
- All primary schools have 2 PC computers with a color printer in their classrooms from P1 – P4
- All labs have at least one color laser printer and one black/white laser printer

Local Area Networks

- Networks in recent construction projects are new and current
- Middle schools have three LANs (library, Business Studies & General Purpose)
- Some middle schools have a CD tower in the library
- CedarBridge has a WAN (TBI WAN), providing resources, including Internet
- Berkeley has 4 LAN's (library, Business Studies & 2 Computer Studies)
- All 18 primary schools have their labs networked to a file server as well as the administrative area

Wide Area Network

- Designed to provide Internet, library and administrative resources to schools

- All schools are on the TBI WAN which has been recently upgraded but requires further upgrading to increase speed and performance
- A web server – www.moe.bm exists on this WAN to provide an internet presence for the Ministry of Education and schools
- TBI WAN, firewall and proxy services at CedarBridge site is administered by resident technical staff

Administrative Network (Open District)

- Primarily, administrative use: student records and attendance
- Available in all primary and middle schools for office use
- Connected to a district server (SQL server) at CBA, via leased lines and high-speed modems.
- Supports data entry connections and has direct Internet connectivity

Library

The school library is fully integrated into the school's curriculum, programs and activities and is central to the process of life-long learning.

The library must provide resources and assistance in locating, utilizing, and evaluating information. It should allow for the unique needs of its students, educators and the community. This requires an online retrieval system that can be used by students throughout the school and should also be accessible to the community. This will permit resource sharing within and outside the Follett library system.

The mission of the library is to:

- support the educational goals of the Ministry of Education;
- improve student achievement;
- ensure that every library user has the opportunity to become an effective user of information;
- promote literacy and the enjoyment of reading, listening and viewing;
- support academic and recreational reading;
- provide resources and learning activities that represent a diversity of experiences, and opinions;
- promote intellectual freedom and access to information;
- help produce a technologically astute work force;
- help create engaged citizens;
- nurture life-long learning; and

- provide an environment conducive to academic preparation, research, study, personal interest, and interaction.

The library serves as a focal point of the student's learning environment. Therefore the Library must facilitate access to information by being equipped with technology and staffed with a professional librarian and support staff. The library needs to be accessible before and after school to provide additional time for students to access information. The staff provides leadership and expertise in use of information and instructional technologies. All workstations need to be able to access the Internet and other information sources. Equipment capable of accessing and utilizing all current forms of media and information should be made available in the library.

In this age, access to current information is critical to users. The existing library technology system must continually improve in order to integrate all necessary functions and interface with other systems outside the District. This will require ongoing training and professional development of all staff. Additionally, because centralized technical support is essential, staffing needs to be sufficient to support the level of technology in the library and throughout the school

The school's library is currently equipped with 12 computers and a computer-based library programme, Follett is used to assist in the circulation and cataloguing of library media. A CD Tower equipped with several library resources such as electronic encyclopedias is being planned for.

Hardware Count

Preschools

| School | PC Computers | Printers |
|------------------------|---------------------|-----------------|
| Lagoon Park Preschool | 5 | 4 |
| Somerset Preschool | 5 | 4 |
| Southampton Preschool | 5 | 4 |
| Warwick Preschool | 5 | 4 |
| St. Paul Preschool | 5 | 4 |
| St. John's Preschool | 5 | 4 |
| Devonshire Preschool | 5 | 4 |
| Prospect Preschool | 5 | 4 |
| St. Mark Preschool | 5 | 4 |
| Lyceum Preschool | 5 | 4 |
| St. George's Preschool | 5 | 4 |
| St. David's Preschool | 5 | 4 |

Totals **60** **48**

Primary Schools

| School | PC's | Printers | Servers |
|-------------------|-------------|-----------------|----------------|
| Somerset | 42 | 14 | 1 |
| West End | 42 | 14 | 1 |
| Southampton Glebe | 42 | 14 | 1 |
| Port Royal | 45 | 18 | 1 |
| Heron Bay | 40 | 14 | 1 |
| Gilbert | 45 | 18 | 1 |

| | | | |
|--------------------|------------|------------|-----------|
| Purvis | 45 | 18 | 1 |
| Paget | 50 | 22 | 1 |
| Northlands | 40 | 22 | 1 |
| Victor Scott | 45 | 22 | 1 |
| Elliott | 45 | 20 | 1 |
| West Pembroke | 50 | 22 | 1 |
| Prospect | 45 | 22 | 1 |
| Francis Patton | 50 | 18 | 1 |
| Harrington Sound | 45 | 20 | 1 |
| St. George's Prep. | 40 | 18 | 1 |
| East End | 45 | 18 | 1 |
| St. David's | 40 | 14 | 1 |
| Totals | 796 | 306 | 18 |

Middle Schools

| School | PC's | Printers | Servers |
|------------------------|------------|------------|-----------|
| Sandys | 110 | 40 | 2 |
| Spice Valley | 100 | 35 | 2 |
| Dellwood | 140 | 50 | 4 |
| Whitney | 90 | 32 | 2 |
| Clearwater | 90 | 30 | 2 |
| Totals | 530 | 187 | 12 |
| | | | |
| Senior | | | |
| The Berkeley Institute | 435 | 60 | 15 |
| CedarBridge Academy | 780 | 120 | 10 |
| Totals | 1215 | 180 | 25 |

Facilities**Preschools**

- Some do have moveable furniture which can be secured.

Primary

- Each primary school except Gilbert Institute has an air-conditioned computer laboratory, but some cannot adequately accommodate a full class, because of space and insufficient equipment. Flooring, power and security are satisfactory.
- Many classrooms cannot accommodate more than three computers because of a space and a lack of security, suitable furniture, electrical power outlets and whiteboards. Dust from playing fields is carried into classrooms through opened windows and blackboards which produce additional dust. The problem is aggravated by improper cleaning of these areas.
- Primary schools have a limited network infrastructure which is confined to the computer lab and administrative office.

- Gilbert Institute has a wireless network infrastructure which was installed in September 2002 as a pilot project to determine the feasibility of using wireless networks at the primary level.

Middle Schools Infrastructure

- Dellwood has a complete digital network infrastructure installed. Awaiting further construction of Gymnasium and Science Buildings.
- Sandys Secondary Middle School has a complete digital network infrastructure installed.
- Spice Valley Middle School has a complete digital network infrastructure installed.
- The cabling designs for Clearwater are currently under development and Whitney Institute will be developed at a later date.
- The schools will continue to use Local Area Networks until the buildings have been completed after which cabling will be installed and the schools will be connected.

Senior Schools

- CedarBridge Academy, opened its doors in September, 1997 with a new complete digital network infrastructure installed, however, the network components such as servers, hubs and switches will be upgraded in August 2002.
- The Berkeley Institute, which occupies a series of buildings dating back to the 1920's, is currently in the process of preparing plans including a telecommunications infrastructure for the new school. In the interim, plans are in place to upgrade the physical plant and infrastructure at the Berkeley so that the various instructional programmes and technology access are in place to satisfy present needs and those for the new millennium.

Components of the IT Strategic Plan

Curriculum Technology Infusion Strategy

Shift in Teaching Techniques

Education is moving away from the “frontal bombardment” of constant lecture in the classroom. Cooperative learning, active learning, individualized instruction and exploration, and the teacher as a facilitator/mentor will mark the classroom of the future. Rather than all students being involved in the same activity at the same time, as in a traditional computer lab, individual technology problem-solving stations, productivity areas, and exploration stations within individual classrooms will become increasingly important.

Software

Today, educational researchers are calling for very different uses of technology. They promote classroom learning in which students work in small groups rather than in isolation or as a whole class. The technologies used in classrooms are not those designed explicitly to teach basic skills, but rather are real-world applications that support research, design, analysis, composition and communication.

Since technology has tremendous power to help students find, organize, manipulate and display information, students can use technology tools (such as word processing, database, spreadsheets, design and graphing software, Internet, etc.) in similar ways as do professionals in business, communications and research.

Educational software falls into two broad categories: content-specific (e.g., drills, tutorials, simulations, existing databases) and open-ended (e.g. word processors, drawing programs, etc.).

Content specific software can be effectively integrated in particular subject areas. Such software generally relates to a specific topic or subject and delivers information to the student. It can be used for reinforcement, remediation and as a resource. It is valuable to include the use of content specific software when planning a computer-based program.

Open-ended or application software requires that the student bring information to the computer. Each such program, therefore, is widely applicable. It is highly desirable to include the use of open-ended software when planning a computer-based program.

Teachers can refer to curriculum documents to select relevant software and design appropriate student activities. Students will use computers to manipulate and present information in ways that improve their own understanding and that of their audience.

Curriculum Software Standards

Software is systematically previewed by staff, purchased, catalogued and distributed from the Department of Education's Computer Centre. Site licenses, upgrades and lab packs are purchased and distributed in order to comply with copyright laws.

Microsoft Office will be purchased for all Primary, Middle and Senior Schools. Other software to match curriculum is recommended by the various officers, who received input from subject committees and members of the Information Technology Team.

UltraKey is a keyboarding programme used in the business studies area. **Skillsbanks** and **Cornerstone** are integrated learning systems which provide students with individualized instruction in nearly 300 basic skills and shows them how to apply these skills to problem-solving. These packages contain features which support students with special needs and students who need to improve their basic skills. A teacher can check student performance and create individualized programmes. It will also assist teachers in differentiating instruction to meet the diverse needs of today's learners.

Integrating Application Software Across The Curriculum

Learning experiences gain impact if they are part of an organized and meaningful whole. Learning will be even more powerful if students can see the relevance of what they are doing as related to real-world situations. Computers are a part of our daily life - they are integrated into almost every aspect of it. It follows, therefore that it is necessary to infuse technology into the school curriculum in an integrated manner. It is not suggested that there be a computer link with every activity in every subject. The intent is to integrate relevant computer activities into each subject area. How many activities and in what manner depend on the individual teachers, the needs of the students and the resources available. Planning is the operative word.

Application software has applicability to every subject area. Through experience with the features of word processors, databases, graphics programs, and so on, teachers will recognize how such tools may be used by students to explore, analyze and communicate information. Students using computers in this manner are using them to accomplish curricular tasks. Computers are thus playing a supporting role to the curriculum. The following descriptions are presented to illustrate possible uses for application software across the subject areas, where appropriate.

Word Processors

In every subject there are opportunities to write. Word processing because of its ease of editing and formatting can facilitate the writing process. Research has shown that students write longer, more complex sentences and are more willing to revise and edit their work; they are able to concentrate on the thoughts they want to express rather than the mechanical skills of penmanship, spelling and grammar.

Students will use word processing software across the curriculum to:

- complete school and homework assignments

- compose letters, memos, poems, essays, reports, research papers/projects, proposals, job descriptions, resumes, scripts, lists, outlines and notes
- keep a personal journal
- edit and format various documents

Publishing and Graphics Programs

For most students and teachers, the use of graphics can be intrinsically motivating and almost everyone can get professional-looking results. At the preschool level, graphics begins with electronic colouring books progressing to professional quality publishers at the senior level. You need not possess any particular artistic ability or skill; most of the programs have selections of pictures you can choose from and then modify, or you can produce your own. The ease of editing that is characteristic of the majority of graphics programs encourage student and teacher to experiment with color and to continue to refine the document until they are satisfied. Generally publishing and graphics programs are used to do the following:

- create logos, artwork, letterhead
- create illustrations, maps, charts
- create professional looking forms, layouts for newsletters, brochures, announcements
- work with scanned images
- create on screen presentations, and presentation materials

Databases

The use of computer databases is an increasingly important tool for students. It is rapidly becoming not merely a school skill but a life skill for the present generation of students. More and more colleges, research facilities and businesses are relying on the use of electronic databases for the collection and reporting of information. Primary school students will use databases to explore the concept of searching, retrieving and analysing data.

The database is an excellent vehicle for tackling and reinforcing problem solving and critical thinking skills. The construction of a successful database mirrors the steps necessary to solve a problem effectively. It requires the identification of the problem, the gathering of information relevant to solving the problem, the formulation of possible solutions using that information, the execution of the solution, and the evaluation of the results.

Using database programs, students can:

- organize collected data
- browse and explore information
- search and retrieve information
- create and sort lists
- maintain address lists and print labels
- create form letters

Spreadsheets

The primary strength is its ability to calculate and make predictions on the basis of numerical data. Spreadsheets provide opportunities for students to enhance their higher order thinking skills. Students can enter collected data and analyse that information by performing calculations of the data and representing that data in a different form such as a chart.

Typically spreadsheets are used for:

- calculating numerical data
- graphing numerical data
- making projections
- creating tables and sorted lists

Internet Access

The Internet is a collection of millions of interconnected computer networks around the world that make it possible to share information almost instantly. The networks are owned by countless commercial, research, governmental and educational organizations and individuals.

Users of the system can collaborate easily and quickly through messaging, discussion groups, and conferencing; they are able to discover and access people and information, distribute information, and experiment with new technologies and services. The Internet has become a major global infrastructure for education, research, professional learning, public service and business.

The Internet can expand classroom resources dramatically by making resources from all over the world (including original source materials) available to students, teachers and administrators. It brings information, images and even computer software into the classroom from places otherwise impossible to reach, and it does this almost instantly.

Access to these resources can yield opportunities for collaboration, curriculum materials and idea sharing that are beyond the reach of schools.

Internet access also makes contact with people all over the world possible, bringing into the classroom experts in many content areas, new and old friends and colleagues in education.

Curriculum Infusion Projects - XL Education Initiative

The California State Senator, Diane Watson, arranged for a Bermuda delegation, composed of the XL Steering Committee and a number of government ministers to meet with persons at Stanford University to discuss the possibility of developing an IT curriculum for Bermuda's public schools.

The proposal from the Stanford team, led by Charles Simoni, Professor for Innovation in Teaching, Dr Eric Roberts of the Stanford Computer Science Department, detailed plans to develop both the basic and dynamic curriculum for the XL Initiative project. Ellen Lim, XL, Chief Information Officer of XL Limited, believed that Stanford's proposal to develop this curriculum would ensure that learning is coordinated seamlessly to recognize students' full potential and adapt to their changing needs.

Core ideas of the model

A major motivation for introducing a new computing curriculum into the Bermuda school system was to achieve the following goals:

1. All students graduating from Bermuda public schools will achieve a high-level of computer and technological literacy.
2. These students will be prepared to utilize computers and technology in their jobs or advance to college and graduate programs where they can compete with students from other countries without being handicapped by a lack of familiarity with immediately relevant technology.
3. A cadre of highly skilled students will emerge from Bermuda's graduating high school classes to enter the job market as globally competitive information technology professionals.

In addition, Stanford has articulated several additional principles that will make it possible to achieve the desired outcome.

1. ***Solid foundational knowledge.*** Computing literacy requires much more than a working knowledge of a particular set of tools. The computing industry is incredibly dynamic. Today's tools quickly become tomorrow's antiques. The same, unfortunately, is true for information technology workers whose training has been too specialized. To maintain currency in the field, people must come to understand at a fundamental level how computers work and what core concepts are shared by the tools in each succeeding generation. Stanford has focused on these core concepts in

the courses taught to nonspecialists and has considerable experience teaching long-term concepts along modern tool sets.

2. ***Individual empowerment.*** For many students, the greatest impediments to developing facility with computing are psychological rather than technical. Many students approach computing with a strange mixture of fear and awe: technophobia coupled with technoreverence. On the one hand, computers - being unfamiliar and increasingly central to daily life - tap into fears of the unknown. On the other, computers are often seen as much more powerful than they in fact are, to the point that many students consider them to be out of their own league. In our experience, the best way to counter these psychological barriers is to concentrate on giving each student a sense of individual empowerment, building their confidence and efficacy along with their technical skills. Moreover, the curriculum must be designed in a way that challenges students and gives them an incentive to develop both their cognitive and technical skills. Maintaining these goals will have considerable impact on the dynamics of the educational process and the concrete design of the curriculum.
3. ***Equality of access.*** Students within ALL schools at ALL levels have equal access to Information Technology resources to assist them learn ALL subjects. In seeking to achieve a universal level of coverage at the level that this term applies, it is important to be sensitive to the fact that different segments of the population may respond differently to specific pedagogical approaches. . In Bermuda, for example, it is essential to ensure that the curriculum works as well for students of African descent as it does for Europeans. Similarly, many studies - including a report entitled *Gender Gaps: Where Schools Still Fail Our Children*, have demonstrated that technology education often tends to favor boys at the expense of girls. The curriculum developed for Bermuda must take into account the diversity of the student population to ensure that all students have the same chance to succeed.

New Models of learning for teaching

A crucial component of any successful technology program in schools is a detailed, in-depth teacher training program. A major implementation pitfall in past attempts to integrate technology into classrooms has been failure to provide teachers with adequate professional development in educational technology. Too often, teacher training stops after teachers have acquired only rudimentary computer literacy skills. The challenge is to provide teachers not only with a comprehensive computer skill set, but more importantly, a framework within which they can successfully apply their skills to a variety of classroom applications. Teachers must reach a level of confidence with technology which empowers them to find innovative uses of technology for their own classrooms.

Several avenues for developing a teacher training program have been explored. Initial discussions with NYU, MIT and Columbia Universities revealed that this project needed input from a teacher training program whose focus was on collaborative learning. Currently plans are underway to set up a partnership with the prestigious Curry School of Education at the University of Virginia. Their unique focus on collaborative learning

techniques will provide an excellent basis upon which to build a community of support for teachers involved in this project. In addition, members of the Stanford team will be stationed in Bermuda over the summer to ensure that curriculum design and development and teacher training go hand in hand. By involving local teachers throughout the design process, we hope to encourage the design of a curriculum which is adaptive to the needs of teachers and students alike.

TRT

Ellen Lim, XL Initiative Chair, is pleased to announce the XL Initiative Teacher Readiness Team (TRT) appointees. TRT members are Bermuda teachers and education officers who have been selected to work with Stanford University and the XL Initiative Steering Committee to prepare Bermuda's teachers for a new pedagogy which fully integrates technology and education. This pedagogy will be developed in the coming months by Stanford University with the help of TRT members. The first Stanford delegation to Bermuda is currently on the island to meet with TRT members as part of an exploratory and fact-finding mission.

Technology Training Strategy

Teacher Training

Establishing a base standard for teacher competency in the use of technology and the ability to incorporate technology into daily lessons plans, is a key success factor for the implementation of this IT Strategic Plan. The responsibility to achieve these base levels is shared between the Ministry and the teachers. It is the Ministry's responsibility to clearly define the knowledge levels required and to provide an appropriate amount of time and training opportunities for teachers to obtain the levels. It is the teachers' responsibility to upgrade their skills to the level that are required for them to be successful teachers in this millennium.

A major potential implementation pitfall is failure to provide teachers with adequate professional development in educational technology. Teachers need to be trained to use the technology and they need to be trained in how to apply it instructionally within their particular curriculum. Too often, technology training is discontinued after the teachers acquire rudimentary computer literacy or are taught the basics of using a specific piece of software. But it is one thing to be able to open up a piece of spreadsheet software, for example, and quite another to have a repertoire of instructionally useful activities for students to learn mathematical concepts through constructing spreadsheets and graphing the data.

In addition to providing ongoing professional development, teachers need adequate time to experiment with the technology and to design and implement good technology-based activities within their discipline. Technology-using educators agree that such activities not only take longer to implement with students but also require more advance planning and preparation on the teacher's part. Schools that give teachers adequate time to acquire technology skills, plan technology-based activities, and share their technology-related work with each other are more successful in bringing a large number of teachers to a level of technological proficiency.

The Ministry must establish a clear base level of technology literacy for all teachers. Teachers will be required to be certified that they reached the required levels and those teachers that do not, within the allocated time period, should be given supplemental training. If a teacher cannot achieve the base standards even after supplemental training opportunities, then they should be removed from the classroom and placed in a position where technology proficiency is not a requirement.

As part of their long term instructional technology plan, principals will need to ensure that ongoing training needs are addressed. Some of the basic education that is required for all teachers are:

Network Training

This training would include procedures for logging on and off the network, accessing programs and files on the network, saving and printing files over the network, accessing electronic mail, library and Internet services.

Productivity Tools Training

This training would be provided at regular intervals during the school year and would be differential in that all teachers may not need the same degree of training because of the differing levels of competence with application software.

Content Specific Training

The various departments will need to be provided with specialized training for the teachers within their departments. For instance, P.E. teachers will need to learn how to use fitness analyzing software, science teachers will need to learn how to use probe software, French teachers will need to learn how to use the language based multimedia CDROM instructional software, learning support software and adaptive devices, etc.

Infusing Technology into the Curriculum Training

Teachers will require training and support for not only learning to use new technologies but also for acquiring skills in designing and implementing meaningful technology-based learning experiences for their students. This will need to be given frequently to take into consideration the new trends and products that emerge from year to year.

Other

Training would also need to be provided to teachers on the use of specialized hardware devices such as computer display devices, scanners, laserdisks, CD-ROMs, etc.

Network administration/maintenance training

Specific training relative to the successful administration and maintenance of the networks will also need to be provided for the on-site network administrator by the service providers.

Estimated Costs for Teacher Training**Teacher Training**

| Type of School | # of Schools | # of Students | # of Teachers |
|----------------|--------------|---------------|---------------|
| Preschool | 12 | 417 | 56 |
| Primary | 18 | 3342 | 379 |
| Middle | 5 | 1486 | 173 |
| Senior | 2 | 1367 | 181 |
| Special | 1 | 50 | 6 |
| | 37 | 6662 | 795 |

Assumptions:

| | |
|--------------------------------------|-----------|
| Cost/day of training | \$1000 |
| | 10 |
| # of students / class | |
| # of training days/teacher/year | 5 |
| Overseas Training Days (50 Teachers) | 3 |
| Cost/day of overseas training | \$1200 |
| Total cost: | \$577,500 |

IT Staff Training

With the pace of technological change it is imperative that IT support staff regularly update their skills. The potential return on investment for IT training is excellent and organizations that do not show a clear commitment to training their IT staff are doomed to lose them.

This strategy has allowed for two weeks of IT specific training per IT support staff. One of these weeks will likely have to be off-island due to the specific nature of many of the applications being utilized by the Ministry. (e.g. Winschool, Follett, etc.) Also by the nature of these IT courses, and the requirement to have ongoing IT support in the office, there is little or no opportunity for the Ministry to arrange “bulk” sessions where several IT staff can attend courses at the same time.

IT Staff Training

Assumptions:

number of days off-island training 5
 number of days on-island training 5

Average daily cost on-island \$750
 Average daily cost off-island \$1,000

Number of IT employees 18

Total Cost: \$157,500

Administrative and Professional IT Training

Current expertise in general office automation software ranges from expert to novice, with the majority of staff nearer the novice levels. To increase office and professional staff productivity three days per year should be set aside specifically for IT training.

Admin & Professional Staff

Assumptions:

Cost/day of training \$1000

of students / class 10
of training days/teacher/year 3

Number of admin / prof. employees 100

Total cost: \$30,000

|

PC Fleet Management Strategy

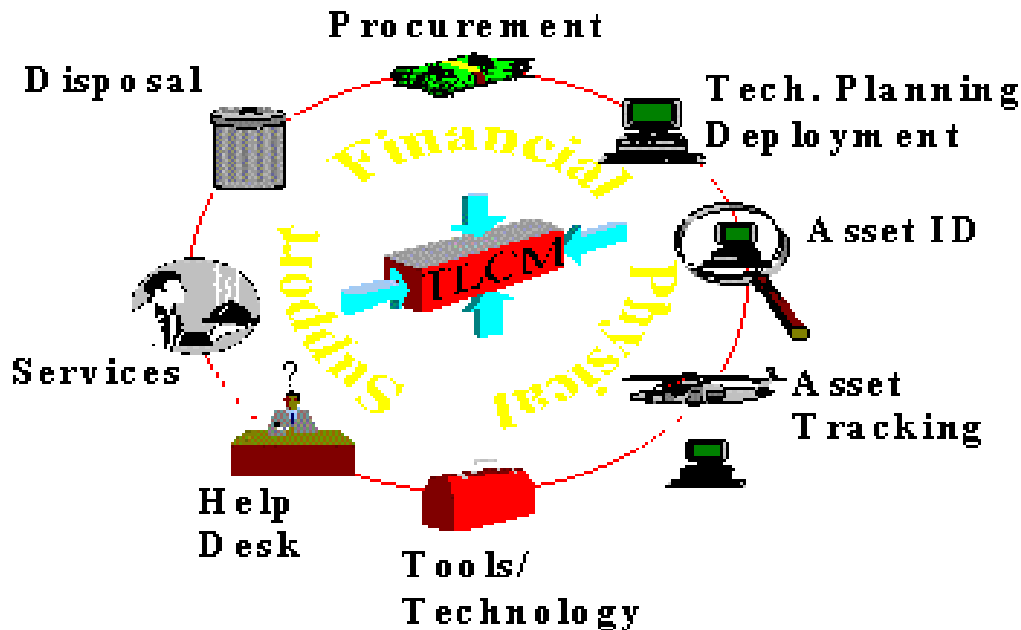
In any large organization the costs of providing and supporting PCs to their end-users has become a major budget concern. Therefore many organizations have switched to the industry best practice of Total Cost of Ownership (TCO) management. Under the TCO model an organization does not just focus on the purchase price of an asset but rather looks at the total costs associated with owning the asset throughout its lifetime. By focusing on TCO an organization can then implement industry best practices to continually reduce its TCO

Luckily the days of justifying who requires a PC are long behind us, and it is generally accepted that all management, professional and administrative employees require a PC as basic tool, much like the telephone. In the school environment the question becomes what the appropriate ratio of PCs to students is. A basic ratio must be established as a goal to work towards and to manage from. As time goes by and technology costs decrease there is little doubt that the ratio of PCs to students will be 1:1.

Once these initial ratios are established the management challenge is to build the appropriate capacity while not letting the existing inventory get out of date. The general industry standard for the useful life expectancy of a PC is three years. Beyond the three year horizon the cost of maintaining the PC surpasses the cost of replacing it.

The goal in PC fleet management is to create an “evergreening” inventory of PCs that will never become obsolete. When an individual PC reaches the end of its three year lifecycle it automatically replaced with a new unit.

The general lifecycle of a PC has the following components:



Gartner Group, a world renowned IT research institute, estimates that annual TCO for a networked PC to be approx. \$13,000. By implementing industry best practices their research suggests the following potential savings can be achieved:

| Potential Improvements to TCO through Asset Management Best Practices | Annual TCO Reduction/ Savings |
|---|-------------------------------|
| Automated Asset Management | 3.9% |
| Hardware Inventory | 0.4% |
| Software Inventory | 1.8% |
| Automated Software Distribution | 2.6% |
| Server Based Client Image Control | 4.6% |
| Service Desk | 10.6% |
| Vendor Standardization | 1.9% |
| Platform Standardization | 4.5% |
| Application Standardization | 5.9% |
| Centralized Procurement | 0.5% |

In preparing this three year IT Strategic Plan the following assumptions have been made for the purposes of developing the PC Fleet Management acquisition schedule:

- 1) Every manager, professional, or administrative staff member, including teachers requires a dedicated PC.
- 2) The target ratios for PCs to Students in the classroom are:
 - Senior schools 1:1
 - Middle schools 1:3
 - Primary schools 1:4
 - Preschools 1:8
- 3) Every school will continue to require a minimum of one computer lab and PCs will also be required in the libraries.

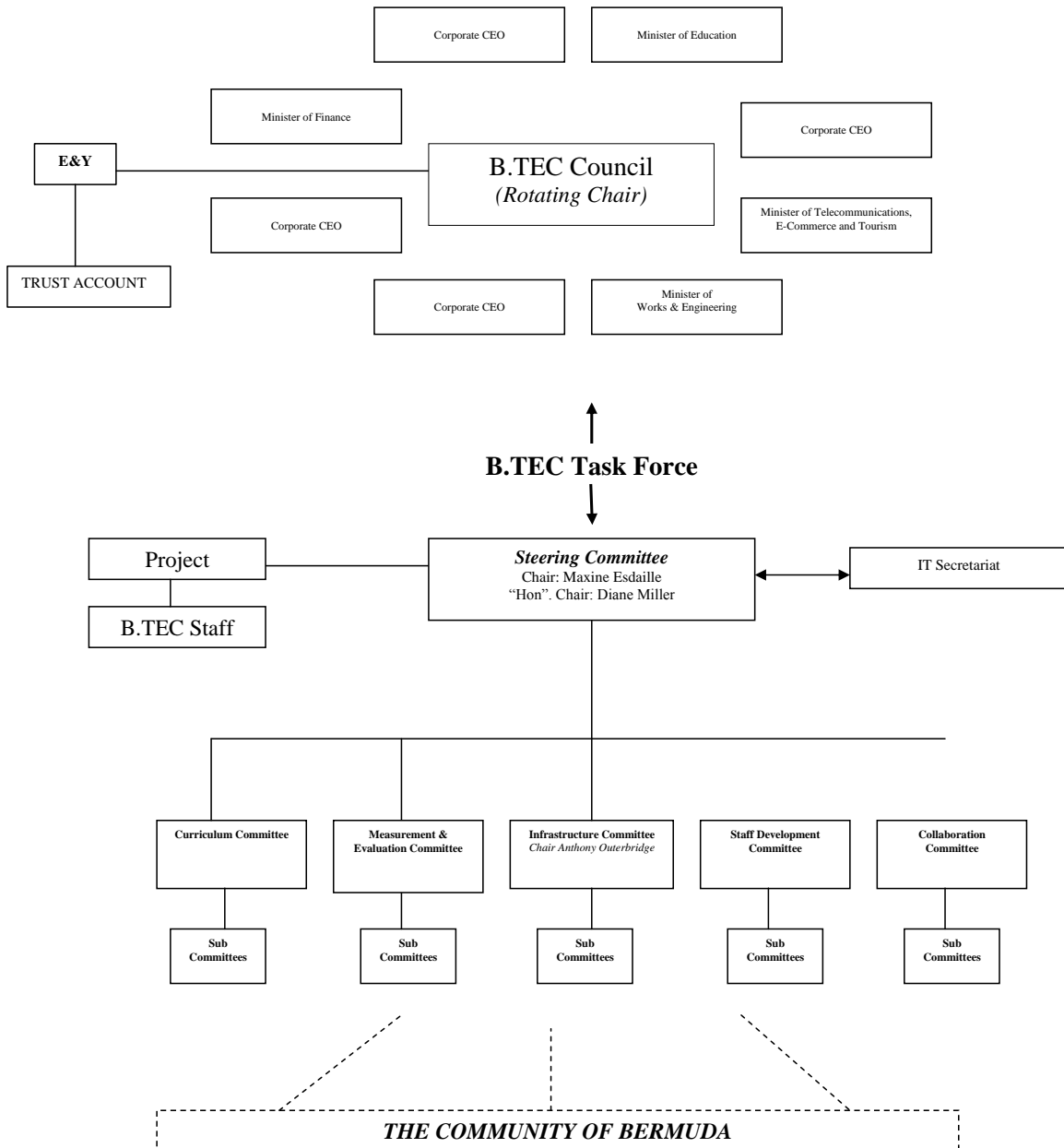
| | # of labs | # of PCs/Lab | # of PCs/Library |
|-----------------|-----------|--------------|------------------|
| Senior Schools | 6 | 25 | 25 |
| Middle Schools | 2 | 25 | 13 |
| Primary Schools | 1 | 25 | 5 |
| Preschools | 0 | 0 | 0 |

- 4) The Plan will be implemented over a three year period with the oldest third of the existing equipment being replaced every year. By the end of the third year the ministry will have a completely current evergreening PC fleet.

IT Funding Strategy – “A Public / Private Sector Partnership Model”

B.TEC

Bermuda Technology Education Collaborative



Creating a base technology infrastructure for the delivery of a technology infused curriculum is a monumental task given the current state of the schools. Investments must be made to keep existing infrastructure current while continually adding new capacity and functionality. If funding this strategy is going to be left solely to the resources within government it is unlikely that a sufficient infrastructure will be able to be built in a timely fashion.

However, the private sector has long supported the Ministry of Education and they have an appreciation for how quality education has a direct effect on their productivity and profitability. Where the private sector has concerns is in ensuring that their contributions are used wisely and in a cost effective manner. In short, they would be more likely to invest larger amounts of money if they had direct involvement in the decision-making process for how the money is spent and they are updated on the direct benefits accrued from their investment.

This IT Strategic Plan represents the first step in providing the Ministry's partners and stakeholders with a long term plan and process for creating dramatic improvements in the technological infrastructure and education within the Bermuda school system. With the private sector buy-in to the Ministry's plan and their day-to-day involvement in the execution of the plan, available funds through private sector investment will increase substantially.

The Ministry will create a Board of Directors (BTEC Council) that will oversee the IT Trust fund. The members of the Board will consist of a representative sample of private sector companies that have contributed to the fund and senior public service executives. All members will be appointed by the Minister of Education. The Ministry's IT Manager will be the Secretary of the Board and the Board Chairperson will be elected by the members.

The Trust fund would be to have private sector funds matched equally with public sector, however this process will need to be managed based on need.

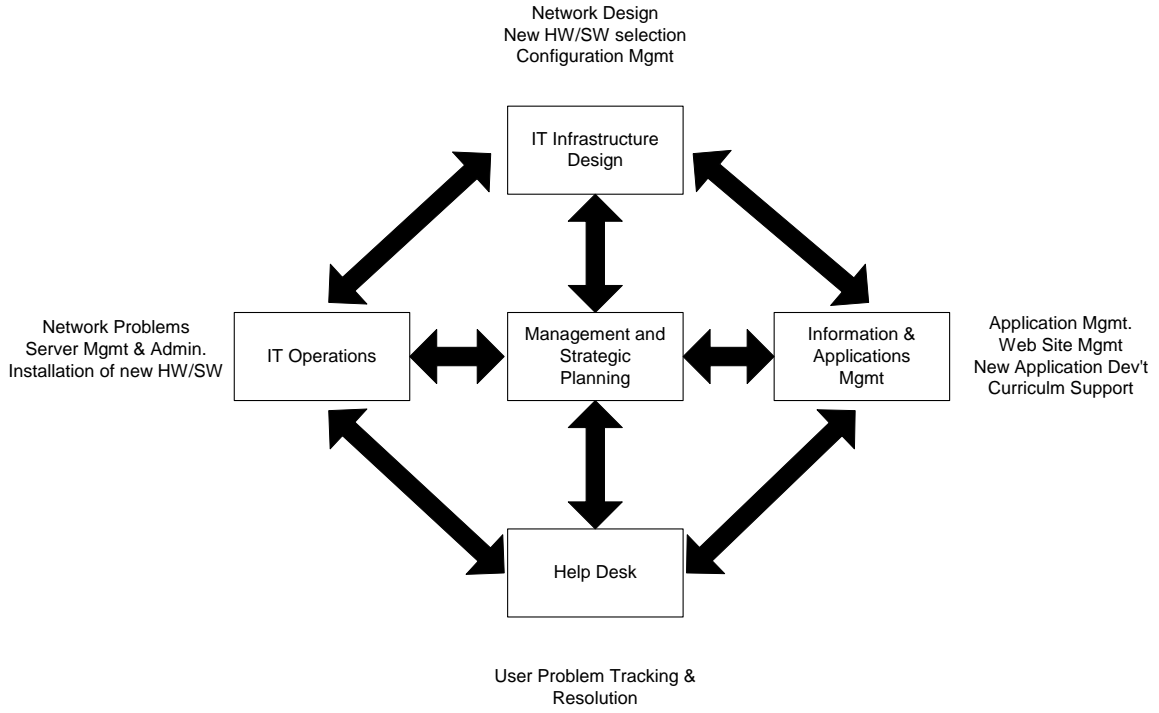
Consideration may also be given to the implementation of a special Technology Education Contribution, whereby a small dollar amount (\$1-2) will be collected from all subscribers' utility bills and would be used to supplement the IT Trust Fund.

IT Organization Strategy

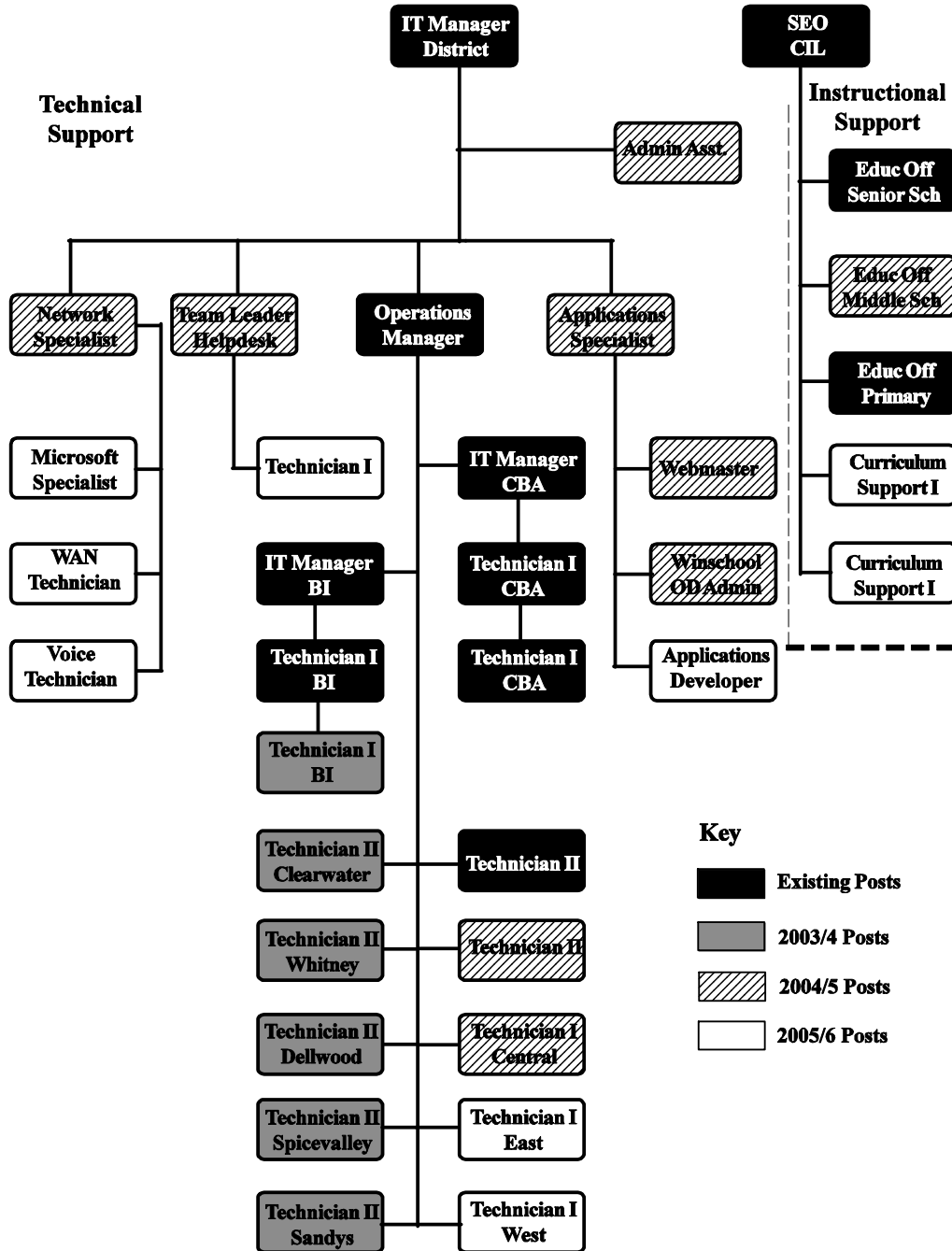
- Creation of an IT Department within the Ministry headed by a Chief Information Officer (CIO) that has two main offices; IT Management and Support Office and the IT Curriculum Development and Support Office
- 4 current IT Support staff are all on temporary assignments and only 2 staff (1 full-time and 1 part-time persons) assigned to IT curriculum development,
- Current work exceeds capacity without adding ANY more IT within the ministry
- Outsourcing non-critical functions is an alternative but will be more costly in the long run. A good candidate for outsourcing is hardware diagnosis & repair
- Existing skills need to be upgraded
- Compensation needs to be reviewed and standardized across government
- Berkeley and Cedarbridge IT staff should report to the new IT Department.

IT Department Principles

- IT resources exist to improve education opportunities for students and to improve Ministry administration and management
- IT Department management will balance a number of competing interests, will develop cross-school priorities and assign resources dynamically to priority areas
- IT Department services will be reliable, and timely
- IT Department services will be measurable and governed by Service Level Agreements (SLAs)



IT Organizational Chart



Key

- Existing Posts
- 2003/4 Posts
- 2004/5 Posts
- 2005/6 Posts

Strengths of the new Organization

- Common management of the IT Curriculum Development and Support functions and the IT Management and Support functions
- Increased IT management. & support and IT curriculum development and support capacities
- Ability to mobilize IT resources to priority initiatives (i.e. more flexible, responsive and scalable)
- Improved communication between previously dispersed IT staff/organizations, resulting in improved effectiveness and efficiency
- Additional responsiveness to business change
- Increased ability to create and enforce IT standards and achieve consistent services and service levels
- Structured career path for IT professionals; increased staff retention and attraction

IT Department Staff Budget

| | Annual Salary | # of Positions | of Extended |
|--|---------------|----------------|-------------|
| Chief Information Officer | 92,000 | 1 | 92,000 |
| Administrative Assistant | 40,000 | 1 | 40,000 |
| IT Management and Support Office | | | |
| Technology and Network Mgmt Specialist | 80,000 | 1 | 80,000 |
| Microsoft Software Specialist/Trainer | 65,000 | 1 | 65,000 |
| End User Support - Team Leader | 65,000 | 1 | 65,000 |
| IT Support Analyst - Sr. - District | 55,000 | 3 | 165,000 |
| IT Support Analyst – Jr. - District. | 45,000 | 4 | 180,000 |
| IT Support Analyst – Sr. Senior Schools | 55,000 | 2 | 110,000 |
| IT Support Analyst – Jr. – Senior Schools | 45,000 | 2 | 90,000 |
| IT Support Analyst Sr. – Middle Schools | 55,000 | 5 | 275,000 |
| Operations Manager | 80,000 | 1 | 80,000 |
| Administrative Support Specialist | 60,000 | 1 | 60,000 |
| Web Master /Intranet Development Specialist | 60,000 | 1 | 60,000 |
| Application Developer | 60,000 | 1 | 60,000 |
| IT Curriculum Development and Support Office | | | |
| Education Officer IT Curriculum Senior Schools | 80,000 | 1 | 80,000 |
| Education Officer IT Curriculum Middle Schools | 80,000 | 1 | 80,000 |
| Education Officer IT Curriculum Primary and Preschools | 80,000 | 2 | 160,000 |

Technology, Information, & Application Management Strategy

Technology Architecture Strategy

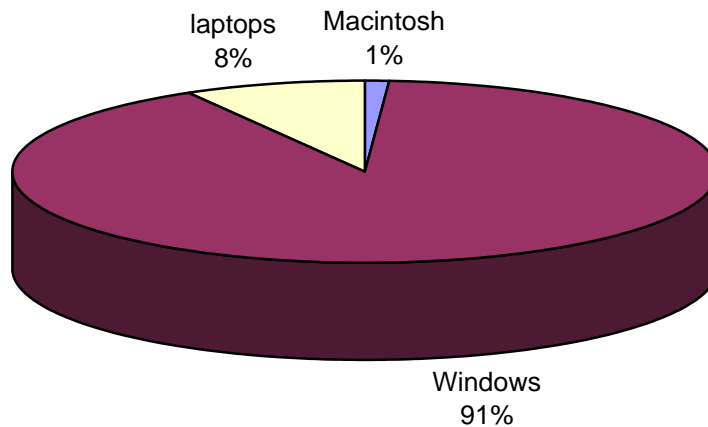
The technology architecture for the Ministry describes the technical environment and standards that will be used in the selection of hardware, system software, and network equipment.

In order to maximize support resources and have high availability and reliability the philosophy of the technology architecture is to utilize proven market leading technologies and open standards where available.

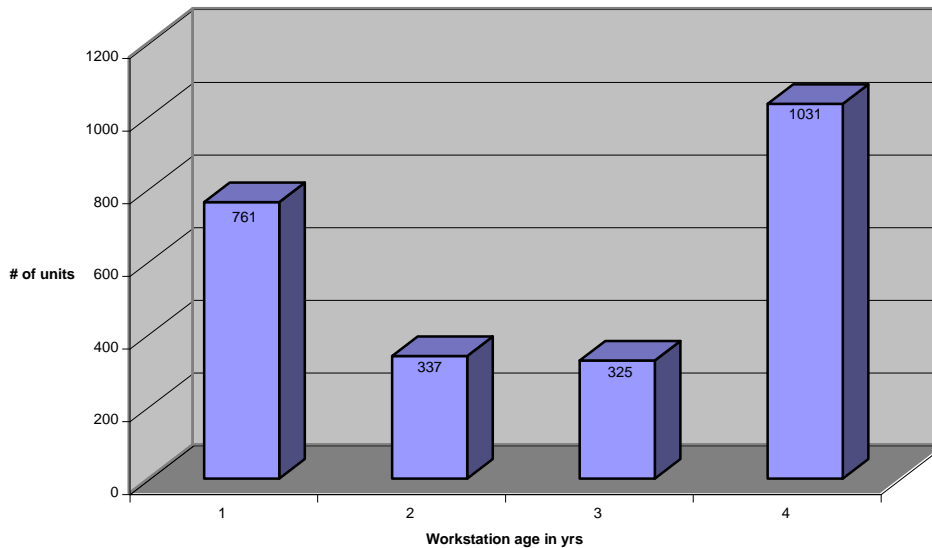
Desktop Computers

The Ministry is standardizing to a PC environment. Macintosh computers have been discontinued and currently exist in very small quantities at the preschool.

Computer Type



Age Distribution of Workstations



From an operating system perspective desktop computers in the Ministry currently include Macintosh OS 7.53, Windows 98, Windows 2000 and Windows XP. In the immediate term the Ministry will standardize on Windows 2000 for servers, while planning a conversion and implementation strategy for the migration to Windows XP at the desktop. The migration to Windows XP at the desktop will not occur until that OS is proven to be stabilized which is forecast for sometime late in year 2002.

Server Based Computing – “The Thin Client Model”

The school environment offers unique challenges for desktop support do to the curious and sometimes mischievous nature of students as well as the geographic disbursement of the systems and generally lower level of technical support available. Creating an environment where computer desktops have full functionality with maximum manageability and minimum opportunity for students to reconfigure or break equipment is a strategic goal for the ministry.

There are several levels of potential central management of school based desktops, ranging from software such as SMS for controlling and “pushing out” desktop software configurations (still using the fat client model) to deployment of thin client terminals that access Terminal Server computers located either in the local school computer hub room or potentially even off-site. The thin-client model offers several other advantages above and beyond increased manageability and reduced technical support; it also provides a lower cost desktop with potentially a longer life span, with much lower electrical requirements. On the surface these potential benefits are very attractive given the current situation in Bermuda’s schools.

In the first year of the Strategic Plan the Ministry will continue to use the Fat-Client approach until the Thin-Client model is proven to be successful with the education environment.

Server Platforms

For the most part, all servers across the ministry are Windows 2000 and serve many tasks, such as email, file & print, library application servers, etc. These servers are for the most part inadequately maintained and the operating software environments on a few of them are out-of-date.

Servers are at the heart of any network environment and must be managed and monitored on a daily basis. All servers will be connected via a Wide Area Network using the Microsoft Single Domain model, and central administration tools put in place to ensure proper capacity planning and maintenance are performed on a regular basis.

All servers will be brought to common operating environment utilizing Microsoft 2000 as soon as possible. Additional manageability functionality and reliability will be gained by this migration. Pilot testing of the existing application software will need to be performed to ensure software functionality is maintained in the new environment.

Local Area Networks (LANs) and Wireless Technologies

Within individual school environments and ministry administrative environments LANs will be implemented to allow communication throughout the school, access to central servers/services, and access to the internet. The topology will be 10/100BaseT Ethernet and will be based on either the Category 5e or 6 standard. There is a significant cost difference in implementing Category 6 infrastructure (approx 25%) but strategically it will position the Ministry for longer term viability of the network.

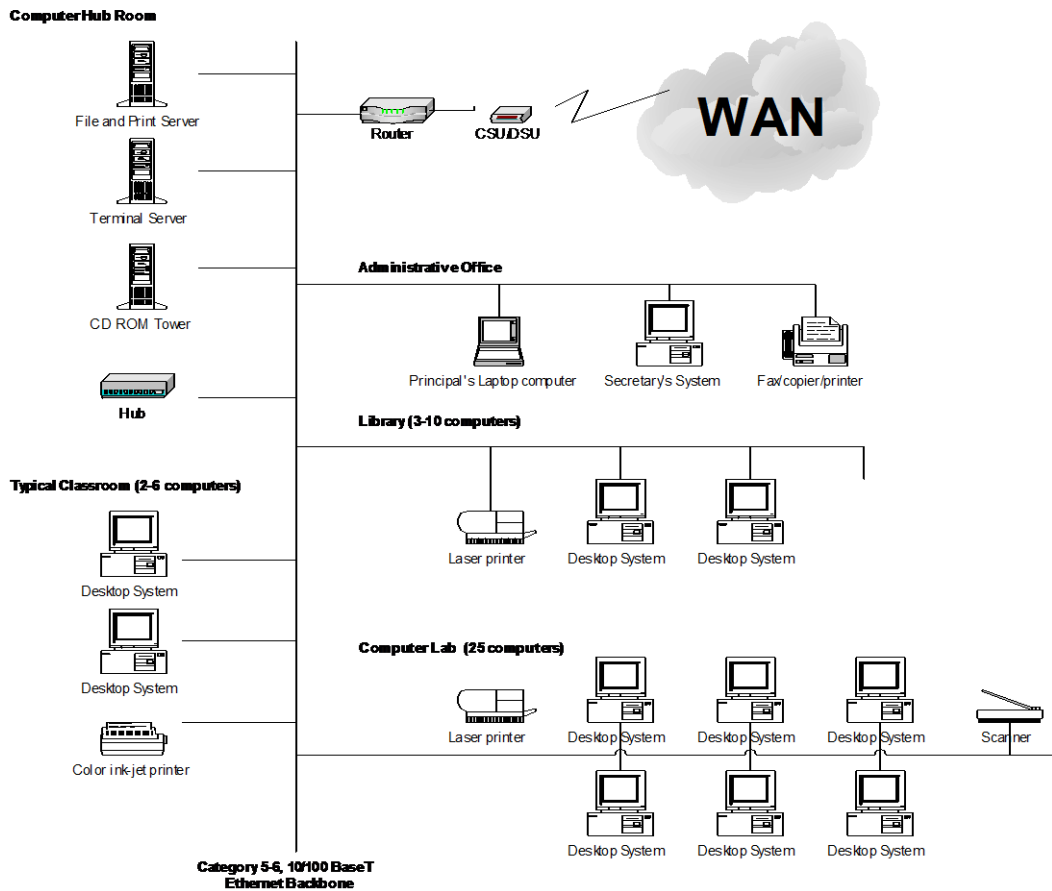
Implementing LANs within Bermuda schools offers several challenges based on the age of the buildings, building techniques and construction materials. The facilities upgrading plan address this later in this plan. One strategic consideration that must be reviewed is the degree to which wireless technologies can be utilized.

Wireless technology reduces the amount of cabling and its associated costs for installation. It facilitates networking capability in facilities where cabling is difficult or impossible. Unlike hard-wired networks, wireless technology makes allowance for flexible rearrangement of computer networks. Addition of workstations is easy and temporary setup of networked computers for special tasks is possible. It is even possible for wireless technology to support mobile computing while connected to network facilities.

Wireless technology should not be considered to be a total replacement for hard wire connections, especially in areas such as computer lab rooms. Currently the technology does not offer the access speeds that hard wire physical connections do, which may limit curriculum options. Wireless technologies are also changing at a very fast pace and selecting standard equipment may be difficult.

The potential costs savings, flexibility, and speed of implementation are very attractive potential benefits to the Ministry. In the first year of the Strategic Plan the Ministry will continue to use the hard wire approach until the wireless model is proven to be successful with the education environment. A wireless pilot project was installed at Gilbert Institute in September 2002 and will be monitored and evaluated throughout the year to determine its effectiveness as a network solution for the primary schools.

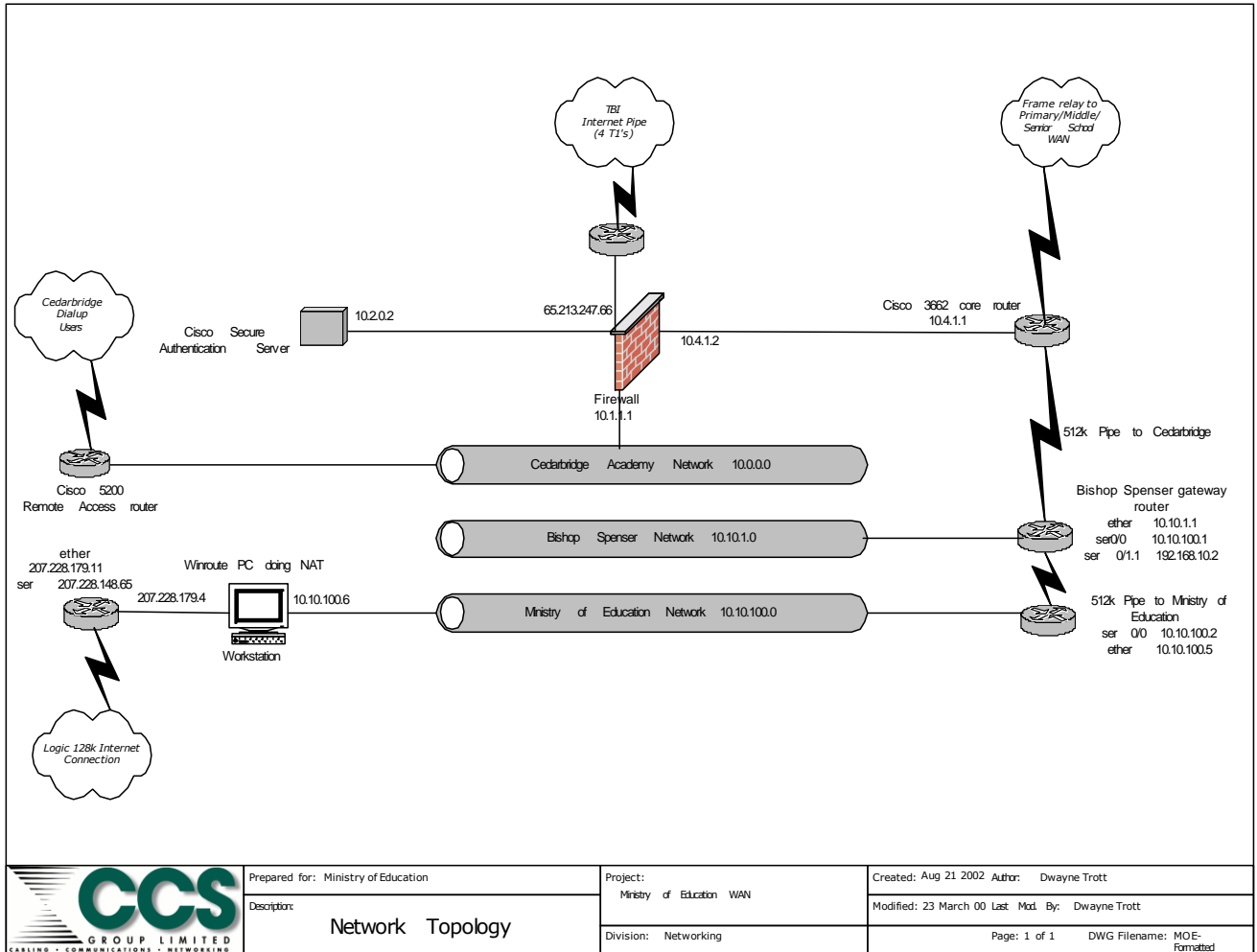
Logical School Technical Architecture



Wide Area Network (WAN)

A high speed WAN will be installed to connect all schools and administrative offices. (excluding preschools). At this time it is not felt that there is reasonable cost justification

for connecting preschools via a dedicated WAN connection. Options will be evaluated to give Head Teachers access to email for the purposes of improving communication.



From the logical diagram above note that remote access services to the WAN will be provided so that mobile users or after-hours users will be able to connect. There will be a centrally managed email, firewall, and content filtering services provided for the schools as well.

The "Technology Infused" Classroom

In order for a classroom to be able to make full use of available technologies there are several technologies and accommodations that need to be considered. Not every

classroom will either require or make use of each of the following but they should all be considered prior to implementing technology within the classroom.

1. Television

A television should be available for use in each classroom with access to cable television. This television should have audio and video input and output jacks to facilitate connection to other equipment. One or more classrooms in the building should be equipped for video conferencing, allowing the transmission and reception of educational activities and instruction directly with remote sites.

2. Computers

A computer in the classroom can be used to control multi-media presentations which could include a laser videodisc player, CD-ROM, audio, and other media sources. With access to a building local area network, the computer can access shared resources distributed through the network. A wide area network connection for the computer can provide access to data bases and information sources outside the building including the Internet. Through the network, the computer in the classroom will also provide a way to collect and maintain data on student achievement, in addition to assisting the teacher with other management tasks. The computer can also be utilized for student presentations and projects, as well as computer-assisted instruction with individuals or small groups of students. Laptop computers available for classroom use can be an effective way of moving computer resources temporarily to rooms that need additional computer access. Classrooms should provide additional network connections for laptops that may be used in the room.

3. CD-ROM

CD-ROM is a publishing medium, providing a way to distribute large amounts of information in a compact, computer-readable format. A CD-ROM drive in the classroom, attached to a computer, adds the capability to handle digitized audio and video, as well as large amounts of searchable text into the classroom.

4. Projection

Projection of images on a screen will continue to be an important learning aid. A LCD system capable of projecting the computer screen should be available. With the use of the video feature, large numbers of students can view a presentation in an auditorium-type setting. It is recommended that LCD units be available for use in classrooms along with overhead projectors and screens.

5. Audio

Classrooms should have an audio system, which is capable of handling cassettes and compact discs. Digitized audio is an important source that can be reproduced by a computer, but which often needs amplification through external speakers.

6. Writing Surfaces

Dry-erase boards should replace traditional blackboards because of problems that result from chalk dust in the same environment as computers and other electronic equipment. It is suggested that consideration be given to special lighting for the dry-erase board, enabling it to be used simultaneously with a projected image on the screen while the room lighting is dimmed.

7. Videoconferencing Capabilities

By having access to a mobile Videoconferencing station and wide area network access to the internet from the classroom, collaborative learning experiences can be promoted. In combination with the projection system above and intelligent white boards classrooms can be linked from across the world to share experiences and work collaboratively on projects and problem solving.

8. Other Considerations

Classrooms should be equipped an adequate number of electrical outlets to support multi-media systems, computers, and portable laptop computers that may be used in the future. To facilitate the use of laptop computers in any classroom, consideration should be given for network access and electrical power for these units.

Information Architecture Strategy

The information architecture strategy for the Ministry describes what information is required to successfully deliver the Ministry's mandate and describes the relationships between the information. Currently, the Ministry does not have an information architecture and one must be developed as soon as possible in order to establish priorities and guide future IT investments.

Several potential Major Data Subject Areas have been suggested and prioritized below. These data subject areas require further analysis to define specific data relationships and develop an implementation plan for the resulting databases and related application software to manage the data/information.

1. Student / Children Information (Presently using Chancery SMS)

- Parent information
- Alumni information
- Enrollment information
- Grades information
- Attendance information
- Assignment Information
- Discipline information
- Scholarship information
- Etc.

2. Employee Information (Presently using AS400- JD Edwards)

- Union information
- Service information

- Tombstone information
 - Qualifications information
 - Skills information
 - Etc.
3. Curriculum Information
- Course Description information
 - Textbook information
 - Prerequisite and co-requisite information
 - Etc.
4. Financial Information (Presently using AS400 JD Edwards & Quickbooks)
- Accounts payable information
 - Accounts receivable information
 - Purchase order information
 - Budget information
 - Salaries information
 - Student loan information
 - Etc.
5. School Information (Presently using Chancery SMS)
- Principal information
 - Level Information
 - Board of Directors Information
 - Uniform information
 - Etc.
6. Library Information (Presently using Follett & Destiny)
- Asset information
 - Circulation information
 - Location information
 - Ordering information
 - Etc.
7. Facility Information – Presently using Archibus
- Age information
 - capacity information
 - custodian information
 - maintenance information
 - Etc.
8. Fleet Information (Presently using Help Trac)
- Type information
 - Age information

- Use information
 - Maintenance information
 - Etc.
9. Stores Information (Presently using Quickbooks)
- Inventory information
 - Vendor information
 - Pricing information
 - Order quantity information
 - Cutoms information
 - Etc.

Application Architecture Strategy

The application architecture consists of the business application software used within the ministry with definitions and standards for how the different applications co-exists and communicate between each other. At this point the Ministry is in an enviable position since it does not have significant legacy applications which need to be integrated within a future looking architecture.

The primary applications used within the Ministry are:

J.D. Edwards Financial System

The financial module of the J.D. Edwards software suite which resides on the Bermuda Government's AS400 provides users of the Ministry of Education's Finance section with the capability of managing all of the Ministry of Education's accounting transactions.

Chancery SMS

Open District is built on the Oracle or SQL relational database management system and Windows 2003. It gives that district and schools an integrated, open system and a database that enables information to be accessed, analyzed, and communicated when and where it's needed.

That translates into better resource management throughout the district, increased productivity in the schools and the district office, and lower costs resulting from greater efficiency.

Chancery SMS takes student data at the schools, captured by Chancery's top selling student information systems for Windows and Macintosh -- Win School and Mac School -- moves it across the Wide Area Network and automatically synchronizes it with the district's Oracle or SQL database.

At the district office, Chancery SMS gives your administrators immediate access to complete, current, and accurate consolidated data from the entire district. An end to bottlenecks, duplication, and delays.

Follett & Destiny Library Information System

A most popular library circulation and inventory system for K-12 school environment. The Follett Library Information system empowers students, patrons and staff with flexible searching, streamlined inventory and easy cataloging. The following features are an integral part of this library solution:

- Easier collection management lets you spend more time with students and patrons
- Versatile searching features text or kid-friendly pictures
- Track orders and funding sources with acquisitions functionality
- Reserve items for future checkout with advanced booking
- Enable patrons or students to place items on hold
- Cut cataloging time with step-by-step guides and global editing
- Enhance security with patron pictures
- Customize reporting with ODBC support

Purchased Software vs. Application Development

Keeping with industry best practices for maintaining the lowest total cost of ownership, the Ministry will strive to use purchased application software rather than pursuing custom application development. Furthermore, when implementing purchased application software customizations will be kept to an absolute minimum and where possible business process will be altered to adapt to work flows and processes supported by the application software.

A major consideration in selecting new application software will be its compatibility with the emerging Schools Interoperability Framework (SIF):

Schools Interoperability Framework

SIF is an industry initiative involving leading vendors in the education marketplace to develop a specification that ensures K-12 instructional and administrative software applications work together more effectively. Many additional industry vendors have since joined the effort.

SIF is not a product, but rather an industry-supported technical blueprint for K-12 software that will enable diverse applications to interact and share data seamlessly. It does so by defining a common format for data (such as student demographics, attendance information, library information, food service information, grades and more) that needs to be shared between applications as well as how the software applications will interact with each other.

By following standards, the SIF will enable disparate solutions (e.g., student information systems, library systems, etc.) to talk to each other more easily and allow open access to data for creating reports at the district, state and federal levels using Internet technologies.

|

Security Architecture Strategy

To be added in later draft...after network rfp award

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Facilities Upgrading Strategy – Classroom Connect

The basic physical wiring plant within a facility is the first major building block for building the capacity to deliver a technology infused curriculum. The current facilities upgrading plan is far to lengthy and will not meet the needs of the education system.

For the purposes of this plan it is assumed that the existing facilities and plans for senior schools are adequate and that with the exception of administration, preschools are the lowest priority for wiring infrastructure, and therefore have not been included within this 3 year plan.

The potential to utilize wireless solutions within schools is also very tempting. However, the age of the buildings in Bermuda and the Bermuda stone construction techniques and high moisture content, are severe challenges when implementing wireless solutions. The speed of wireless solutions is also a factor when considering future software use and overall network configuration and operations.

A significant wireless pilot project is underway at Gilbert Institute to determine the viability of wireless technologies within the school environment. If successful, the estimated implementation costs may be greatly reduced and the project timeframes collapsed.

ALL schools, excluding preschools, will have a base communications infrastructure that extends to every classroom and includes a computer hub room, within the three year planning window.

During the first year of the plan, phase II (the cabling of all classrooms) of the primary school cabling project will take place. Additionally, the cable design for both Whitney and Clearwater middle schools is underway with cable implementation to begin during the summer 2003. It is anticipated that all classrooms at the primary, middle and senior levels will be connected to the internet and the district network.

Outline of Planned Infrastructure Projects

In support of the goals and objectives outlined in this plan, the following projects are being planned for implementation over the following 3 years:

Year 2003/2004 – Classroom Connect – Building the Data Network

Preschools:

1. replace 2 Macintosh computers with PC computers and appropriate software **(completed – 24 computers installed)**
2. install additional printers as required **(completed – 24 printers installed)**

Special Schools:

1. install network at The Educational Centre (TEC) **(completed)**
2. install classroom computers at TEC **(completed)**
3. install Student Management System at TEC **(completed)**
4. purchase instructional software for TEC **(completed)**
5. install internet connection at TEC **(completed)**
6. provide training for TEC users **(completed)**
7. install classroom and administrative computers at Hope Academy **(completed)**
8. install internet connection at Hope Academy for administrative users **(completed)**

Primary:

1. complete phase 2 of the network cabling plan which involves providing internet and network connectivity to each classroom (5 data and 1 voice drop) **(completed)**
2. perform electrical upgrades to hubrooms, classrooms and other areas as required **(completed)**
3. install 2 computers and color inkjet in P5 classrooms **(completed – 60 computers installed)**
4. replace P1 computers as required **(completed)**
5. join classroom computers to school network **(completed)**
6. install additional switchgear as required **(completed)**
7. upgrade internet connection to T1 **(completed)**
8. provide email accounts to all teachers and classes **(completed)**
9. ensure that each classroom teacher has access to a classroom computer for email **(completed)**
10. provide training in use of Outlook as required **(completed)**

Middle:

1. install network cabling and wireless network in Clearwater Middle School to provide internet and network connectivity to each classroom **(completed)**
2. install network cabling in Whitney Middle School to provide internet and network connectivity to each classroom for Online Curriculum Pilot **(completed)**
3. complete network cabling at Dellwood Middle School **(completed)**

4. complete Spice Valley Middle School to provide internet and network connectivity to each classroom (**completed**)
5. upgrade internet connection to T1 (**completed**)
6. replace computers in Business Studies Lab (**completed - 130 computers**)
7. install networked PC computers in each middle school classroom (**completed**)
8. provide email accounts to all teachers and classes (**completed**)
9. provide training in use of Outlook as required (**completed**)
10. provide on-site support at each middle school (**completed**)

Senior Schools:

1. continue plans to outfit new senior school (**completed**)
2. integrate existing Berkeley into EDUNETWORK – Active Directory (**completed**)
3. provide training for all teachers of new senior school in use of network and network resources (**in planning stages**)
4. provide for additional on-site support staff for new senior school (**completed**)
5. replace 60% of CBA's current PC fleet with 425 new networked PCs (**completed – MOED, CBA & KPMG**)
6. replace teacher laptops at CBA as needed (**completed – CBA purchase**)
7. initiate Laptop Learning Programme at Berkeley Institute (**completed – Berkeley Initiated Project**)

District

1. employ 3 additional support staff (**completed – staff temporary**)
2. provide IT training to support staff in Citrix, Follett, Help Trac, Winschool/OD, Cisco and Windows 2000 (**completed**)
3. continue with the provision of SLA for PC, network and application support (**completed**)
4. provide resources for the replacement of administrative PCs, printers and software (**completed**)
5. continue to purchase software agreements like the Microsoft School agreement as necessary (**completed**)
6. upgrade and enhance current WAN for performance, redundancy and security (**in progress**)
7. continue with active directory plans to integrate middle and senior schools into the Edunetwork domain (**completed**)
8. implement an educational internet portal/intranet to further integrate schools and provide for the exchange of information (**completed**)
9. install new email system to better serve the needs of school and administrative personnel (**completed**)

Years 2004/2005 – Classroom Computers & Building the Voice & Video Network

Preschools

1. replace Teacher-in Charge computers (**completed**)
2. purchase and/or develop a simple student administration package for preschools (**completed**)

Special Schools:

1. upgrade SMS at TEC (**completed**)
2. install additional classroom computers at TEC (**completed**)
3. install wireless network at Hope Academy (**completed**)
4. install server at Hope Academy (**completed**)

Primary:

1. perform electrical upgrades to classrooms as needed (**on-going**)
2. install voice systems in 9 primary schools (**completed**)
3. make provision for cable television services to library media area (**completed**)
4. install 2 networked PC computers and color printer in P6 classrooms (**completed**)
5. replace P2 & P3 computers (**completed**)
6. install additional switchgear as required (**on-going**)
7. install computer and network printer for each classroom teacher (**completed**)
8. replace printers and software as necessary (**completed**)
9. upgrade internet connections to T1 (**completed**)
10. provide training in the use of School Management System (SMS) and other web-based services such as Homeroom.com and Microsoft Class Server (**ongoing**)

Middle:

1. install computers in Middle school classrooms (8 in core, 4 in encore) (**completed**)
2. install network printers in all classrooms (**completed**)
3. install DLP projectors in all classrooms (**completed**)
4. upgrade/replace network equipment in middle schools (**completed**)
5. replace library computers (**completed**)
6. install wireless network at Clearwater Middle (**completed**)
7. install voice systems at Clearwater Middle (**completed**)
8. install video distribution system at Clearwater Middle (**completed**)
9. install network cabling in new building at Dellwood Middle (**completed**)
10. replace General Purpose lab computers at Sandys and Dellwood (**completed**)
11. install mobile wireless laptop units in middle school classrooms (**completed**)
12. install video distribution network in 3 middle schools (**completed**)
13. upgrade internet connections to T1 (**completed**)
14. provide training in the use of School Management System (SMS) and other web-based services such as Homeroom.com and Microsoft Class Server (**completed**)
15. install document camera devices in select classrooms (**completed**)

Senior:

1. replace remainder of CBA's PC fleet (**completed**)
2. install video distribution network in both senior schools (**not started**)
3. replace CBA network gear (**completed**)
4. replace LCD projectors in senior schools as needed (**on-going**)

District:

1. employ Winschool/Open District support staff (**completed**)
2. install additional core switchgear for MOED network (**completed**)
3. transfer WAN equipment from CBA to Bishop Spencer (**completed**)
4. employ 5 additional support staff (**completed**)
5. upgrade Open District administrative programme to SMS 4.0 to allow for centralize management of all data (**completed**)
6. develop and implement web-enabled Scholarship database application programme (**in progress**)
7. extend internet portal to primary and middle school networks (**completed**)
8. install Great Plains solution for Human Resources Department (**completed**)
9. employ a web/portal developer (**not started**)
10. integrate the MOED and ITO network to facilitate access to required resources on the ITO network (**in progress**)
11. implement a PC refurbishment programme in conjunction with ITO to provide home computers for students (**completed**)
12. provide ongoing IT training for IT staff – Cisco, portal, Microsoft (**on-going**)

Years 2005/2006 – Classroom Community & Continuation of Voice & Video Network Installs

Preschools

1. replace 2 computers at each preschool (**completed**)
2. replace printers and software as required (**completed**)
3. purchase new software as required (**not started**)

Special Schools:

1. integrate Hope Academy into MOED network (**completed**)
2. replace computers and printers as needed (**completed**)
3. install voice system at TEC (**completed**)

Primary:

1. perform electrical upgrades to classrooms as needed (**ongoing**)
2. install voice systems in remaining primary schools (**completed**)
3. replace P4 classroom computers (**completed**)
4. replace printers as necessary (**ongoing**)
5. purchase instructional software including software for internet portal (**not started**)
6. install a second server in primary schools (**not started**)
7. replace/add necessary switchgear (**ongoing**)
8. replace servers as necessary (**not started**)
9. install DLP projectors in computer labs, libraries and some classrooms (**not started**)
10. provide additional training in SMS (**completed**)

Middle:

1. install additional computers in Middle school classrooms (**completed**)
2. purchase additional printers and instructional software (**completed**)
3. install wireless access points in three middle schools (**ongoing**)
4. complete install of video distribution networks in remaining middle schools (**ongoing**)
5. upgrade switch gear as required (**ongoing**)
6. install video servers – United Streaming (**completed**)
7. install voice system in Whitney Middle (**completed**)
8. provide additional training for teachers in use of SMS (**completed**)
9. install document camera devices in select classrooms (**completed**)

Senior:

1. replace computers at senior school as required (**completed**)
2. replace classroom projectors and printers as required (**completed**)
3. replace/upgrade Student Management System (SMS) (**completed**)
4. provide training for teachers in use of SMS (**completed**)

District:

1. employ WAN Technician (**not started**)
2. employ Application Developer (**not started**)
3. employ Microsoft Specialist (**not started**)
4. install Voice Technician (**not started**)
5. install two additional pc support staff (**completed**)
6. replace/upgrade LAN/WAN equipment as necessary (**ongoing**)
7. replace administrative computers as necessary (**completed**)
8. replace core servers with Blade servers (**not started**)
9. install storage area network (**not started**)
10. extend educational network into the community i.e public libraries, prisons, etc. through the provision of web-based services such as Homeroom.com, EBSCO, Blackboard and/or Microsoft Class Server (**not started**)

Budget

| BTEC Budget 2003-2006 | | | |
|---|-----------------------|-----------------------|-----------------------|
| Category | Year 2003/2004 | Year 2004/2005 | Year 2005/2006 |
| BTEC Infrastructure Items | | | |
| Primary School Cabling - Phase 2 | \$900,000.00 | \$0.00 | \$0.00 |
| Electrical Upgrading - Primary Schools | \$250,000.00 | \$350,000.00 | \$200,000.00 |
| Clearwater & Whitney Cabling | \$800,000.00 | \$0.00 | \$0.00 |
| Network Design RFP Award | \$700,000.00 | \$0.00 | \$0.00 |
| P5 - P6 Classroom Computer Install | \$89,600.00 | \$89,600.00 | \$0.00 |
| Primary Classroom Replacements | \$102,400.00 | \$96,000.00 | \$96,000.00 |
| Middle School Classroom Install | \$256,000.00 | \$320,000.00 | \$320,000.00 |
| Middle School Computer Replacements | \$0.00 | \$320,000.00 | \$160,000.00 |
| Special Education Computers Install | \$16,000.00 | \$10,000.00 | \$10,000.00 |
| Special Education Computers Replacements | \$32,000.00 | \$40,000.00 | \$32,000.00 |
| Senior School Replacements | \$416,000.00 | \$525,000.00 | \$550,000.00 |
| Preschool Computers Replacements | \$38,400.00 | \$0.00 | \$38,400.00 |
| MS Library Computer Replacements | \$0.00 | \$0.00 | \$80,000.00 |
| Administrative Computing Replacements - District | \$32,000.00 | \$24,000.00 | \$32,000.00 |
| Network Upgrades - Servers & switches | \$0.00 | \$100,000.00 | \$250,000.00 |
| Primary Schools Voice Systems Install | \$0.00 | \$630,000.00 | \$630,000.00 |
| Software Purchases | \$120,000.00 | \$140,000.00 | \$140,000.00 |
| Furniture | \$75,000.00 | \$100,000.00 | \$100,000.00 |
| LCD Projectors | \$50,000.00 | \$60,000.00 | \$60,000.00 |
| Laptops Replacements | \$39,600.00 | \$44,000.00 | \$44,000.00 |
| Printers & Peripherals | \$75,000.00 | \$100,000.00 | \$100,000.00 |
| Digital Cameras | \$17,500.00 | \$0.00 | \$0.00 |
| Total BTEC Infrastructure Items | \$4,009,500.00 | \$2,948,600.00 | \$2,842,400.00 |
| BTEC Non-Infrastructure Items | | | |
| BTEC - Collaboration | \$585,670.00 | \$585,670.00 | \$585,670.00 |
| BTEC - Curriculum Development | \$263,144.00 | \$263,144.00 | \$263,144.00 |
| BTEC - Professional Development | \$1,022,857.33 | \$1,022,857.33 | \$1,022,857.33 |
| BTEC - Measurement & Evaluation | \$229,800.00 | \$229,800.00 | \$229,800.00 |
| Total BTEC Non-Infrastructure Items | \$2,101,471.33 | \$2,101,471.33 | \$2,101,471.33 |
| Total BTEC Capital Budget | \$6,110,971.33 | \$5,050,071.33 | \$4,943,871.33 |
| Infrastructure Operating - Budget | | | |
| WAN - SLA - Support - BTC Rental | \$230,000.00 | \$180,000.00 | \$180,000.00 |
| LAN - SLA - Support | \$125,000.00 | \$100,000.00 | \$100,000.00 |
| PC Support, parts | \$130,000.00 | \$130,000.00 | \$170,000.00 |
| Software Agreements - Licensing | \$230,000.00 | \$260,000.00 | \$275,000.00 |
| IT Staff & Administrative Training | \$50,000.00 | \$80,000.00 | \$90,000.00 |
| Salaries | \$784,000.00 | \$1,225,000.00 | \$1,468,000.00 |
| Project Management | \$100,000.00 | \$75,000.00 | \$50,000.00 |
| Internet Services | \$15,000.00 | \$300,000.00 | \$300,000.00 |
| Web Services | \$15,000.00 | \$0.00 | \$0.00 |
| BTEC Requests HW/SW | \$70,000.00 | \$80,000.00 | \$90,000.00 |
| Additional Cabling Requests | \$20,000.00 | \$20,000.00 | \$20,000.00 |
| Senior Schools IT Budgets | \$850,000.00 | \$900,000.00 | \$950,000.00 |
| Total Infrastructure - Operating | \$2,619,000.00 | \$3,350,000.00 | \$3,693,000.00 |
| Grand Total - BTEC Capital & Operating | \$8,729,971.33 | \$8,400,071.33 | \$8,636,871.33 |

APPENDIX A

B-TEC BERMUDA TECHNOLOGY EDUCATION COLLABORATIVE

In 1998, the XL Education Initiative opened the gateway to the world of information and communication technology for Bermuda's public school students, their educators, their parents and the community. This innovative project was made possible through the generosity and joint funding of the XL Foundation, the Ministry of Education and Corporate and Community Partners.

The establishment of Initiative was driven by the need for Bermudian students to graduate from the public schools achieving a level of fluency in information technology that meets or exceeds the international standards; to be well prepared to utilize technology in advanced academic post-secondary programs and business careers; and to be highly skilled to successfully compete for information technology jobs in a global market and to become life-long learners.

The Initiative's model was based on creating a public/private sector collaborative, building capacity and sustainability for the systemic integration of information technology into the public school system. The model components included:

- Forging vital strategic partnerships among government, business and community stakeholders
- Collaboratively creating a vision and a strategic plan
- Designing an infrastructure to support the plan
- Coordinating the requisite resources
- Developing and implementing a model program that included a world-class computer science curriculum mapped to the NETS standards adopted by the U.S. Department of Education and interdisciplinary technology integration for Senior School students
- Providing professional development and training to educators for successful implementation and delivery in collaboration with Stanford University and the Curry Center for Technology at the University of Virginia- two of the world's highest recognized institutions specializing in technology education
- Designing an assessment and evaluation component to measure student learning

For two years, the XL Education Initiative was the primary support for the model's goals and activities. Capacity for the importance of providing a high quality technology education curricula to students was building and growing stronger through the active participation and dedication of many stakeholders. As a result of the strong support that

was generated for the work of the Initiative and the visible success that the investment had generated, the original alliance transitioned into the XL/Bermuda Education Initiative- continuing to enhance the commitment level of charter stakeholders while recruiting others to become partners in technology education.

The charge of the newly broadened Initiative was now to expand the original technology model implemented in the public Senior Schools to one that spanned all school grades, P1 through S4; ensuring equity of access to information and communication technology for all students in the Bermuda public school system.

Hosted by the Permanent Secretary of Education in April 2001, a day-long partnership meeting with representatives of a cross-section of all stakeholders in Bermuda was held. Five key components were identified to best continue building capacity and sustainability of technology integration: Curriculum Development; Professional Development; Evaluation; Infrastructure and Collaboration. Representative Committees were formed in these respective areas to provide leadership and oversee the goals of each focus area that were identified through action planning as follows:

- Curriculum Development
To develop a well-structured, dynamic and modular, world-class curriculum which surveys the broad spectrum of the field of Information Technology
- Professional Development
To create a self-sustaining training model which ensures that both teachers delivering_ and education officers supporting Information Technology curricula are well-trained, well-informed and are knowledgeable about foundational, current and emerging technologies and concepts
- Evaluation
To establish a comprehensive, standards-based accountability and evaluation system to measure student learning as identified by the IT curriculum and to assist in providing resources for assessment methods, tools and protocol development in areas related to Information Technology
- Infrastructure
To establish sufficient infrastructure on a sustainable basis at each public school and between schools and administrative buildings to ensure that the capacity to deliver is established and future curricula is provided without limitation to all students
- Collaboration
To build solid, sustainable alliances and partnerships with all stakeholders, creating a synergy that establishes a mutually beneficial relationship that provides the requisite expertise and resources for the successful integration of technology into Bermuda's public school classrooms

As the goals of the XL/Bermuda Education Initiative continued to unfold, it was realized that to have the greatest impact and influence on student learning and achievement in the public schools, that the entire Bermudian community must be engaged and encouraged to have a vested interest in recognizing the value of education and specifically the impact and significance of Information Technology in preparing its youth to compete in a global market.

Recognizing that the Initiative had evolved into a national priority, a renaming of the Initiative was proposed and unanimously adopted by a task force. To represent more authentically the evolution of the collaboration, B-TEC, the Bermuda Technology Education Collaborative, was launched in January 2002. B-TEC is represented by the Task Force comprised of a Steering Committee overseeing the goal implementation of each of the respective Committees that were formed under the XL/Bermuda Initiative. Recognized by the Premiere, the Minister of Education and Permanent Secretary, the Bermudian Parliament, public and private sectors, education and industry and international partners, B-TEC has become a model, paving the way for similar collaborations, in other jurisdictions across the globe, for collaborative partners successfully promoting the value of education through Information Technology.