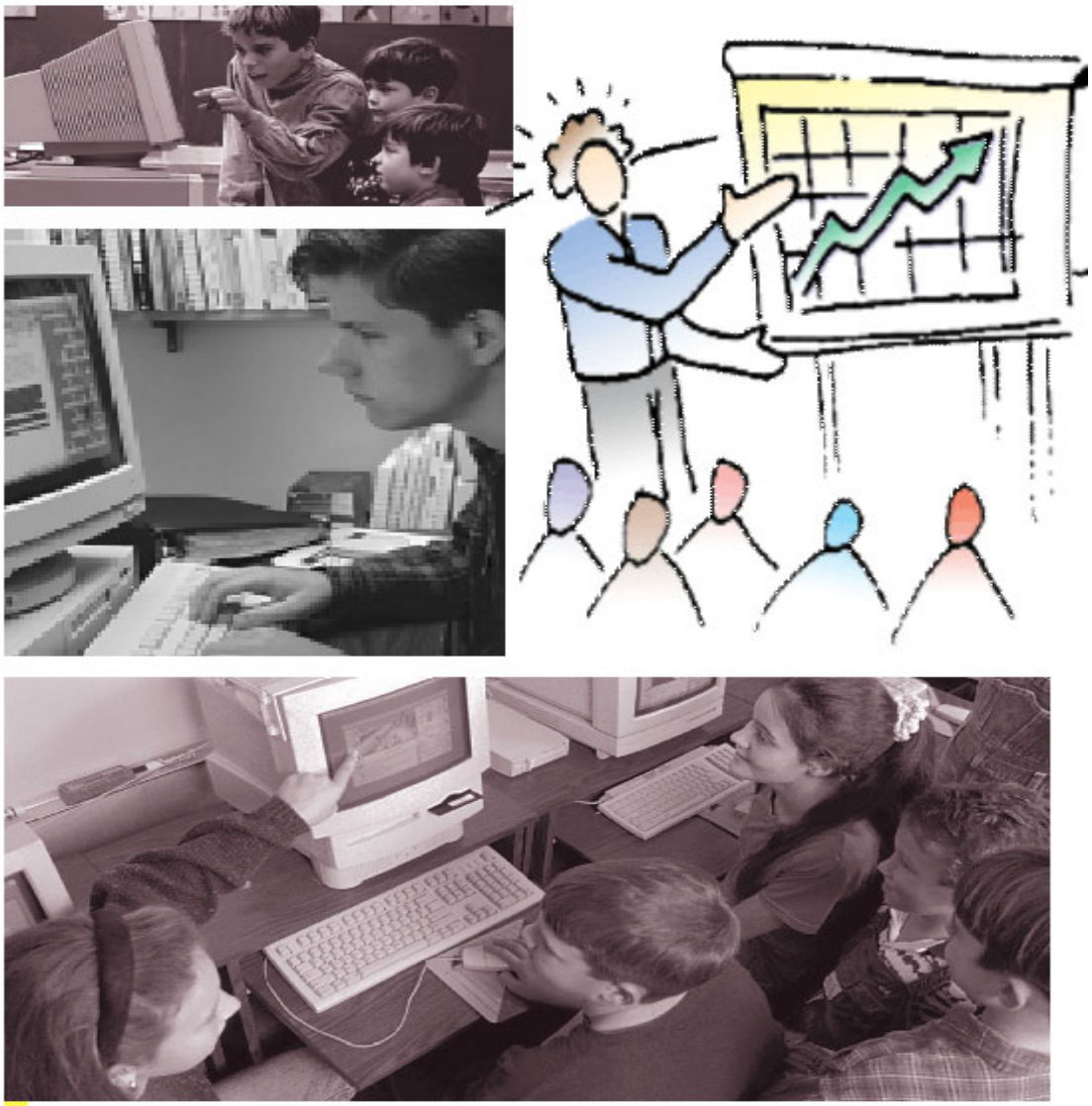
EDUCATION TECHNOLOGY REVIEW REPORT



Campbell River School District

May 2006

School District 72 (Campbell River) gratefully acknowledges the financial support of the Province of British Columbia, through the Ministry of Education, for this initiative.

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The ALTIS Group was contracted by the Campbell River School District to complete an Education Technology Review and to report the findings and recommendations. This report was prepared by The ALTIS Group for the Campbell River School District. Wayne Blair was the ALTIS Group Consultant who organized and conducted the Review. He is the author of this ***Education Technology Review Report***.

Wayne Blair (The ALTIS Group, Alberta), Bob French (Central Okanagan School District, British Columbia), and Todd Kennedy (Pembina Regional School Division, Alberta) conducted the schools and District Departments visitations, interviews, questionnaires,and observations for this Report.

The District Technology Management Committee was instrumental in the design of the Terms of Reference for the Education Technology Review in consultation with the ALTIS Group. The District Technology Management Committee members are:

- John Spry - Superintendent of Schools;
- Craig Gillis - Acting Assistant Superintendent of Schools;
- Lyle Boyce - Secretary Treasurer;
- Marty Cole - Manager of Operations;
- Pat Presidente - District Technology Resource Teacher;
- Kas Angelski - Principal of Timberline Secondary School;
- Roger Gosselin - Principal of Southgate Middle School; and
- Dave Friederich - Principal of Ecole Georgia Park Elementary.

Particular thanks to:

- Lyle Boyce - Secretary Treasurer, and
- Pat Presidente - District Technology Resource Teacher

for their considerable efforts in facilitating the Education Technology Review through contributions such as: advice, ideas, suggestions, organizing and chairing meetings, scheduling visitations and interviews, and the printing, distributing of documents, and scoring of questionnaires.

Thank you to all District staff, students, and community members for their help and/or participation in the completion of the Education Technology Review.

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Table of Contents

1. Executive Summary

The Education Technology Review of the Campbell River School District occurred during January 2006. This review was based on a Terms of Reference developed by District staff and the ALTIS Group. The Education Technology Review Report was submitted in March 2006 and finalized in May 2006, The results of the Education Technology Review Report can be summarized in three sections:

- Overall Schools Stage of Education Technology of Development;
- Education Technology Achievements; and
- Recommendations for Education Technology Improvements.

1.1 Overall Schools Stage of Education Technology Development

First, the Education Technology Review Report is positive and at times very positive with respect to the level of school technology development, integration, and implementation across the District Schools. In summary, the overall average for all schools is at Stage 2.5 on a four point scale, that is between Stage Two (LOW) and Stage Three (MEDIUM). See Attachment 3 for specific details.

In general terms, the District schools exceed **Stage Two (LOW)** where:

> "Stage Two has more teachers beginning to learn about computer technology and student access increases to a weekly basis. Some teachers are integrating computer technology into some subject areas.
>
> As hardware and software are upgraded, there is a mixture of old and new computer technology.
>
> Professional development opportunities increase but the focus is still on hardware and software."

With the District schools well on their way towards **Stage Three (MEDIUM)** where:

> "Stage three computer technology becomes a regular tool for learning and for teaching when they are located in all classrooms and learning locations.
>
> The school has a local area network and the focus shifts to integrating computer technology into subject areas.
>
> Planning for computer technology is an ongoing component of school planning. "

Also, four indicator areas were found to be rated consistently high. These areas are:

- Student Access and Use;

- Teacher Access and Use;
- Infrastructure;
- Software and Hardware; and
- Non-teaching Staff.

It should be noted that overall there are:

- **Similarities in school development —** (defined as less than a range of one stage of development)
    - Infrastructure and
    - Technical Support.
- **Differences in school development — Improvement Areas** (defined as a range of about one stage of development)
    - Planning and Leadership (District) and
    - Professional Development.
- **Major Differences in school development — Improvement Areas** (defined as a range over one stage of development)
    - Student Access and Use;
    - Teacher Access and Use;
    - Planning and Leadership (School);
    - Software and Hardware;
    - Non-teaching Staff; and
    - Funding.

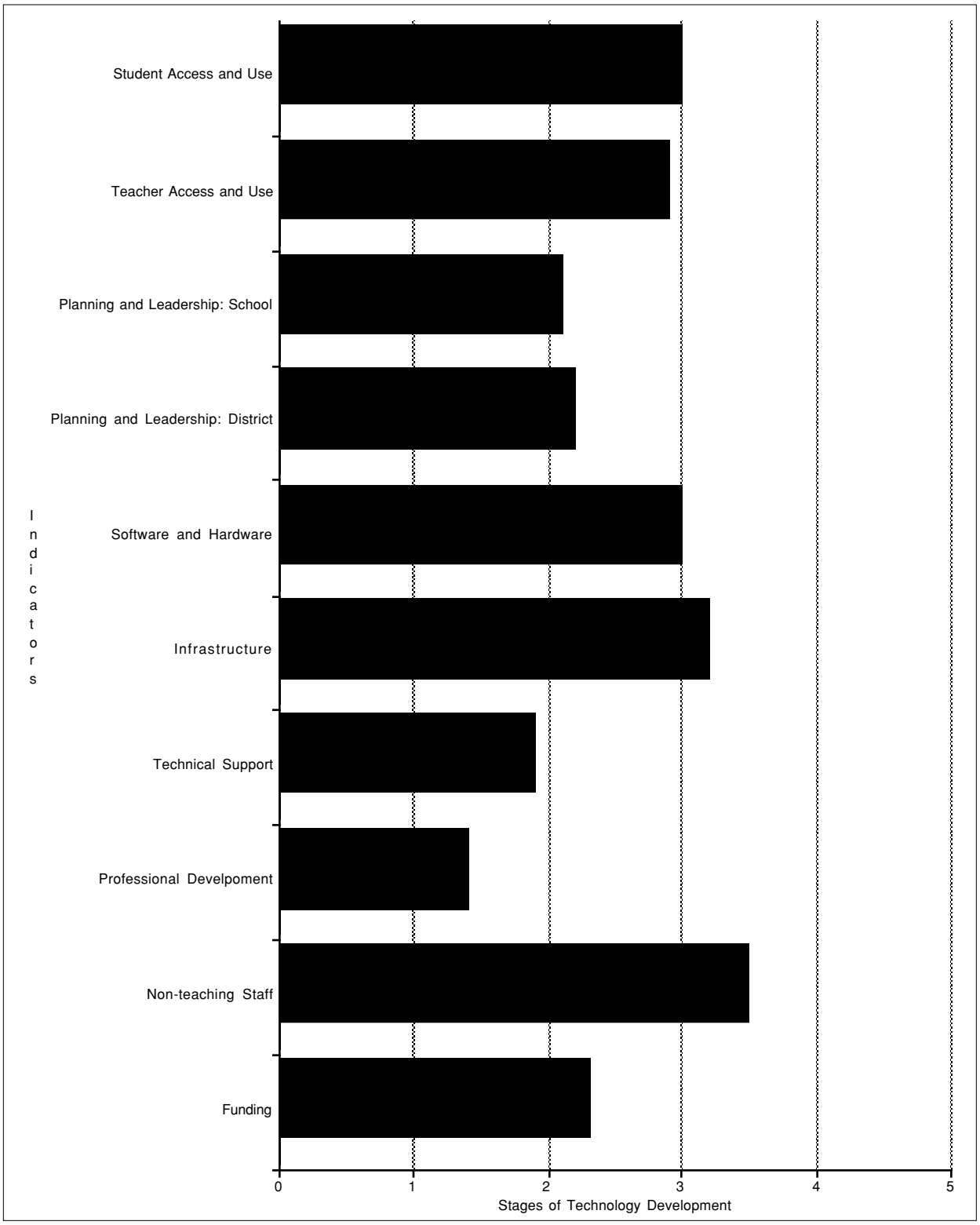
The average results for the stages of development for the District were calculated for each indicator and a District Profile Graph was charted (see next page).

The Elementary, Middle, and Senior school profile summaries were weighted equally in this calculation. That is, all Elementary Schools, all Middle Schools, and all Senior School summaries had an equal weighting of 1/3, 1/3, and 1/3.

An interpretation of this graph indicates that the District Profile Graph for all selected Elementary, Middle, and Senior schools is at the stage of technology development of:

- an average Stage of development of 2.5 and
- with a range of from Stage 1.4 to Stage 3.5.

Profile Graph of the Average Technology Stage of Integration, Development and Implementation for all District Schools



1.2 Achievements

Second, the Review identified twelve Key Education Technology achievements in the areas of:

- Overall District Stage of School Technology Developments;
- District Staff, Parent Advisory Councils, and the Community;
- School Technology Programs and Projects;
- Curriculum Integration with Technology;
- Robron School/Centre;
- Innovative/Pilot Education Technology Projects;
- Education Centre and Library Services;
- School Libraries;
- Software, Hardware, and Network Infrastructure;
- Technical Support Services;
- Support Staff; and
- Administrative Uses of Computers.

1.3 Recommendations for Improvements

Third, the Review identified eighteen Education Technology areas and eighty-six recommendations for District and/or School improvements. The eighteen Education Technology areas are:

- Provincial, District, and Schools Goals Alignment;
- Overall District Stage of School Technology Development;
- Elementary Schools Stage of School Technology Development;
- Middle Schools Stage of School Technology Development;
- Senior Schools Stage of School Technology Development;
- Student Learning and Achievement;
- ICT and Curriculum Integration;
- Pro-D, Inservice, and Training;
- Equity, Funding, and Total Cost of Ownership;
- Innovation/Pilot Education Technology Projects;
- Robron School/Centre;
- Education Resource Centre and Library Services;
- School Libraries;
- Software, Hardware, and Network Infrastructure;
- Technical Support Services;
- Administrative Uses of Computers;
- Management and leadership; and
- Annual Three Year Education Technology Plan.

2. Introduction

A number of discussions with the Campbell River School District resulted in an agreement for The ALTIS Group to conduct an External Education Technology Review. Using the findings and recommendations from the Review, the District and ALTIS Group will use the findings and recommendations as input for a three year District Education Technology Plan.

The Review Terms of Reference and a Review Plan were approved in December 2005. The District visitations, implementation of surveys and school self-assessment instruments were conducted during January 2006.

2.1 Review Terms of Reference

In summary, the Terms of Reference for the Education Technology Review and Recommendations included:

- key accomplishments; and
- future recommendations and challenges in the use of technology.

> **Note**: See District Technology Terms of Reference Draft #2 (December 21, 2005) for more information.

Specific areas of focus for the review included:

- School Use;
- Administration;
- E-Learning; and
- Learning Resources/Libraries.

With each of these areas of focus including aspects of:

- infrastructure;
- operating systems;
- hardware;
- software; and
- facilities for technology.

2.2 Review Assessment and Instruments Plan

The Review and Assessment Plan is based on the Terms of Reference and a selection of review and assessment instruments and processes. These instruments and processes were used to collect data to assess the current District technology integration and use across the School District including key accomplishments and future recommendations and challenges in the use of technology.

> **Note**: See District Technology Review and Assessment Plan (January 5, 2006) for more detail.

This Plan can be summarized by the following chart. In summary, the chart outlines how the Terms of Reference and the assessment instruments and processes relate

to each other. This chart was used to guide and summarize the entire review to collect information on specific Terms of Reference areas.

Chart of Terms of Reference and Assessment Instruments Or Processes for Information Collection

Terms of Reference	Review and Assessment Instruments and Processes					
		A Interviews	**B** Survey	**C** Visitation & Observation	**D** Reports & Policies	**E** Self-assess
	Students (Elementary)			■	■	
	Students (Middle)			■	■	
	Students (Secondary)			■	■	
	Students (Alternate)			■	■	
	Teachers	■	■			■
	Principals	■	■			■
	Administrator	■				
	Operations & Maintenance		■	■	■	■
	Professional Development		■	■	■	■
	Planning, Pol. & Leadership	■	■		■	■
	Funding	■	■		■	■
	Hardware & Software	■	■	■	■	■
	Infrastructure & Networks	■		■	■	■
	Technical Support	■	■	■	■	■
	Library & Resources	■	■	■	■	■

NOTE: Where the instruments and processes, — A, B, C, D, and E can be briefly summarized as:

A. Interviews (some selected or sampled).

B. Questionnaire (Teacher and Principals).

C. School and facilities visitation (sample of elementary schools, all middle and secondary schools.

D. Existing reports, policies, plans and assessments.

E. Self - assessment and validation (sample of elementary schools, all middle and secondary schools.

The reviewers formally interviewed or talked informally to over 150 selected District staff during visitations to selected Schools and District Offices. including:

- Central Office Staff;
- Principals;
- Vice-Principals;
- Teachers;
- Board Members;
- District Parent Advisory Council Members; and
- Support Staff.

The reviewers conducted the Implementation of a school self-assessment instrument (see Attachment 3) *of Stages of School Educational Technology Integration, Development and Implementation* and verified the information collected at the following schools and service areas:

- Eight Elementary Schools:
  - Cedar Elementary School;
  - Discovery Passage Elementary School;
  - Ecole des Deux Mondes Elementary School;
  - Ecole Georgia Park Elementary School;
  - Penfield Elementary School;
  - Pinecrest Elementary School;
  - Ripple Rock Elementary School; and
  - Sandowne Elementary School.
- Two Middle Schools:
  - Ecole Phoenix Middle School and
  - Southgate Middle School.
- Two Senior Schools:
  - Carihi Senior School and
  - Timberline Senior School.
- Robron School/Centre:
  - Adult and Continuing Education Centre;
  - eBlend School;
  - Elm Alternate School;
  - Student Services; and
  - First Nations Education Publications Centre.

In addition, the Infrastructure reviewer visited a number of District schools and departments to observe and evaluate the Schools and District software, hardware, and network infrastructure and technical services.

The sites visited were:

- Central Office;
- Maintenance Department;
- Ten Elementary Schools:
    - Cedar Elementary School;
    - Discovery Passage Elementary School;
    - Ecole des Deux Mondes Elementary School;
    - Ecole Georgia Park Elementary School;
    - Ocean Grove Elementary School;
    - Oyster River Elementary School;
    - Penfield Elementary School;
    - Pinecrest Elementary School;
    - Ripple Rock Elementary School; and
    - Sandowne Elementary School.
- Two Middle Schools:
    - Ecole Phoenix Middle School and
    - Southgate Middle School.
- Two Senior Schools:
    - Carihi Senior School and
    - Timberline Senior School.
- Robron School/Centre:
    - Adult and Continuing Education Centre;
    - eBlend School;
    - Elm Alternate School;
    - Student Services; and
    - First Nations Education Department.

In addition, two District questionnaires:

- one to Principals and Vice-Principals; and
- one to Teachers

included District Teachers, Principals, and Vice-Principals. This return rate was good at about 70%.

3. Achievements

There were many achievements identified by the External Education Technology Review Team. These were:

- Overall District Stage of School Education Technology Development;
- District Staff, Parent Advisory Councils, and the Community;
- School Technology Programs and Projects;
- Curriculum Integration with Technology;
- Robron School/Centre;
- Innovative/Pilot Education Technology projects;
- Education Resource Centre and Library Services;
- School Libraries;
- Software, Hardware, and Network Infrastructure;
- Technical Support Services;
- Support Staff; and
- Administrative Uses of Computers.

3.1 Overall District Stage of School Education Technology Development

All schools were asked to complete a school self-assessment of their stage of technology integration, development, and integration. Only the schools selected for validation visits are included in this Report. This instrument facilitated the self-assessment of each school using four stages of development and nine indicator areas to determine the stages of integration, development and implementation:

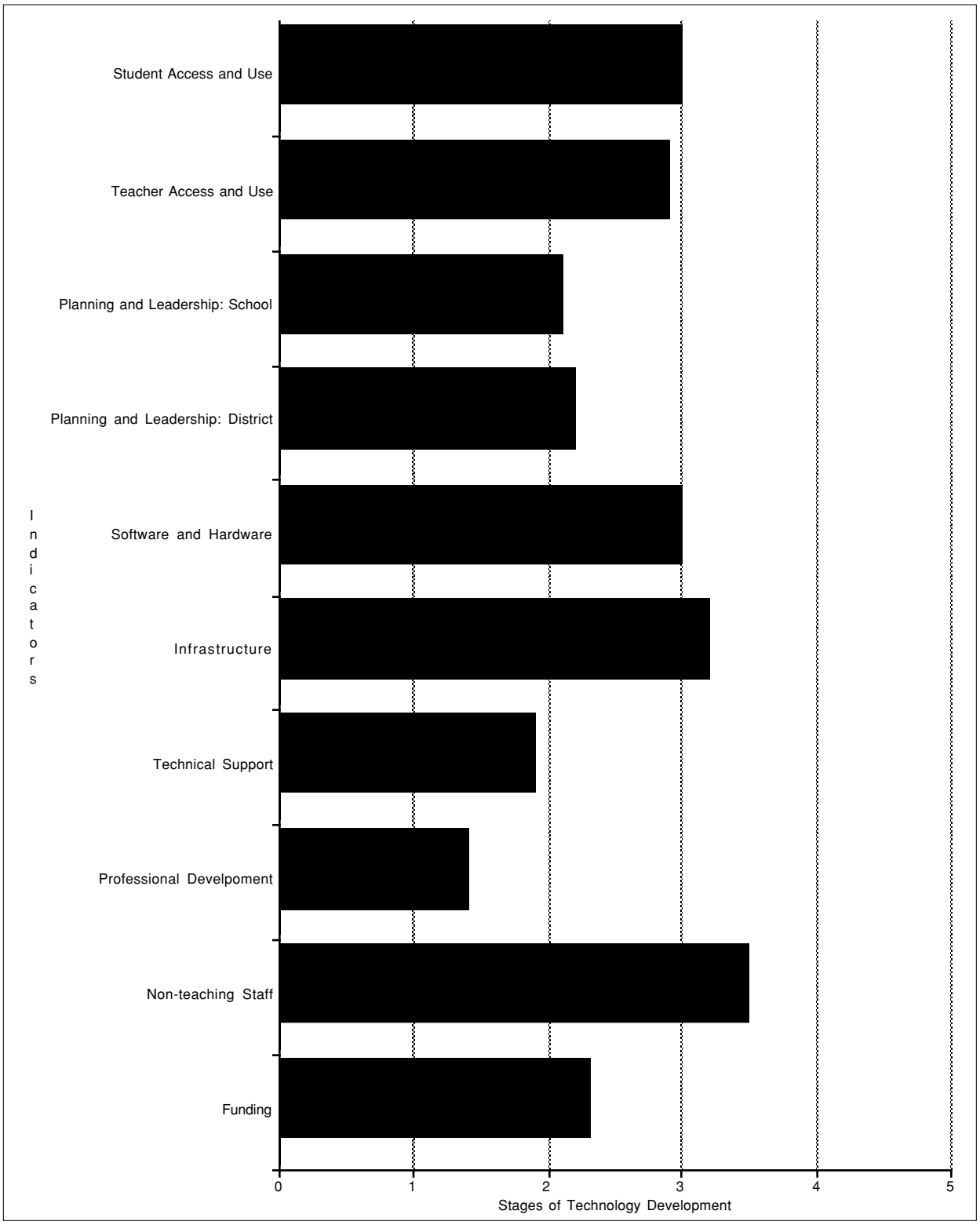
- Stage One — early technology development;
- Stage Two — low technology development;
- Stage Three — medium technology development; and
- Stage Four — high technology development.

In addition, nine indicators were used:

- Student Access and Use;
- Teacher Access and Use;
- Planning and Leadership (School level and District level)I;
- Software and Hardware;
- Infrastructure/Networking;
- Technical Support;
- Professional Development;
- Non-teaching Staff; and
- Funding.

The average results for the stages of development for the District were calculated for each indicator and a District Profile Graph was charted (see next page).

Profile Graph of the Average Technology Stage of Integration, Development and Implementation for all District Schools



The overall average for all schools is 2.5, that is between Stage Two (LOW) and Stage Three (MEDIUM). In general terms, the District schools exceed **Stage Two (LOW)** where:

> "Stage Two has more teachers beginning to learn about computer technology and student access increases to a weekly basis. Some teachers are integrating computer technology into some subject areas. As hardware and software are upgraded, there is a mixture of old and new computer technology. Professional development opportunities increase but the focus is still on hardware and software."

With the District schools well on their way towards **Stage Three (MEDIUM)** where:

> "Stage three computer technology becomes a regular tool for learning and for teaching when they are located in all classrooms and learning locations. The school has a local area network and the focus shifts to integrating computer technology into subject areas. Planning for computer technology is an ongoing component of school planning. "

Also, four indicator areas were found to be rated consistently the highest. These areas were:

- Student Access and Use;
- Teacher Access and Use;
- Infrastructure;
- Software and Hardware; and
- Non-teaching Staff.

The infrastructure Reviewer indicated that the:

> "Campbell River Schools has some remarkable infrastructure to support the technology within it's schools. The Tech Department consists of very dedicated, knowledgeable, and personable staff who seem to have a real desire to provide the best service possible to District staff and students. Campbell River Schools has teamed with PLNet to provide network infrastructure, as well as Campbell River Community Network (CRCN) and Campbell River TV (CRTV). These partnerships have been invaluable to the support of the schools."

The Elementary, Middle, and Senior school profile summaries were weighted equally in this calculation. That is, all Elementary Schools, all Middle Schools, and all Senior School summaries had an equal weighting of 1/3, 1/3, and 1/3. An interpretation of this graph (page 12) indicates that the District Graph for all selected Elementary, Middle, and Senior schools is at the stage of technology development of:

- an average Stage of development of 2.5; and
- with a range from Stage 1.4 to Stage 3.5.

3.2 District Staff, Parent Advisory Councils, and the Community

District Staff, Parent Advisory Councils (PACs), and the Community have been and continue to be very supportive of education technology across the District. The reviewers found that this support comes in many forms. Some examples follow.

- Many Individual teachers contribute an enormous amount of time, in addition to school hours, in maintaining, developing, and helping to create a working technology environment in their classrooms and schools.
- Many Individual teachers contribute a significant amount of personal money, software, and hardware to bring education technology to their students, classrooms and/or schools.
- An Elementary School PAC recently contributed the following:
    - a new digital camera;
    - a new media station Computer lab;
    - a classroom Boom Box; and
    - a new classroom listening center.
- Another Elementary School PAC recently contributed the following:
    - an Apple laptop computer;
    - Apple software; and
    - a digital projector.
- A Middle School PAC recently contributed the following:
    - Computer repairs and
    - Computer upgrades.
- The District has teamed with the provincial PLNet network to provide network infrastructure, as well as with the Campbell River Community Network (CRCN) and the Campbell River TV (CRTV). These partnerships have been invaluable to the growth and support of the technology network throughout the District.

3.3 School Technology Programs and Projects

The reviewers found many exemplary school technology programs and projects that were usually independently developed or developed by a small group. Some examples follow.

- Elementary School level:
    - Using Apple computers that where displaced by a new LINUX lab, two teachers equipped their classrooms with a high number of Apple computers grouped into a number of 'pods' for student use.
    - In 2003-2005, iMovie videos were produced at our school with help from Senior School student mentors and a teacher. Our grade 5/6 students learned how to use a digital camera and make videos.
- Middle School level:
    - Close to 50% CORE teachers or 25% of staff have developed web pages.
    - We have an active media program with students editing and using computer technology.
- Senior School level:
    - Most School Administrators have laptops and use technology regularly for administrative tasks.
    - The Media Arts Programs at both schools are impressive. Although serving a distinctly different group of students, both Media Arts programs provide an excellent foundation in media studies and production.
    - A Physical Education Teacher is using DVD/Projection Technology to demonstrate sports skills to students. Very innovative and creative use of technology in the Physical Education curriculum.
    - The Animation Program and Digital Photography Program are equivalent to and as good as any in the province, not only the use of technology for animation, but the instruction in traditional methods of animation. Particularly noteworthy is the outreach program provided to elementary schools by the teacher of the Animation program.
    - An English teacher is doing great work with a mini-lab of older PCs for word processing and the development of the writing process.

3.4 Curriculum Integration with Technology

The reviewers found many schools working successfully towards curriculum integration with computers. Examples were usually facilitated by the Curriculum Integration with Technology program (CIT). Interviews and the Self-assessment Stages of School Technology instrument and verification by the reviewers found very successful CIT Projects and high support for this program.

The CIT program funds release time to allow a mentor teacher(s) to assist their colleagues with technology integration strategies, demonstration teaching, mentoring, and lesson plan development using information and communications technologies (ICT).

The brief information that follows was obtained by the reviewer from interviews with some of the teachers involved and the Summary CIT Evaluation Reports on the projects. Some examples follow:

- **An Elementary School Example**

  Goals:
  - To continue to help teachers learn to use computers.
  - Teach computers to their classes.
  - Integrate technology into curriculum by using the computer as a tool.

  Participants and Time:
  - Five classes and their teachers who met with the mentor once a month.
  - Classes at the 1, 3, 4, 5, and 6 grades.
  - From January to June 2003.

  Materials:
  - All was accomplished in Clarisworks using the Word processor, Drawing, Spreadsheet, and Database programs. Hyperstudio was installed in preparation for classes, however, there was insufficient time in the lessons to use it. The Internet was usually used for research purposes. Also, all Grade 3 - 6 teachers were encouraged to spend five minutes as part of each lesson developing student keyboarding skills.

  Evaluation:
  - All five teachers indicated gains in their personal growth with respect to using technology to support student learning and curriculum integration.
  - Student computer skills were assessed at the beginning in January and again at the end of May. The results were very positive.

- **Middle School Example**

  - Using the CIT program, I was able to have some time to to help and monitor the booking of two Labs and help teachers design and deliver lessons making use of the information technology tools available in the Labs as well as help teachers upgrade or learn information technology skills as needed.

- Up until the beginning of June, the Labs were booked about 65 % to 70 % of the available Lab time.
- All four core subject areas, as well as P. E., Outdoor Educ., Technology, and French classes made use of the Labs. Typical uses were:
    - English — writing and research.
    - Social Studies — writing and research.
    - Science — writing and research, Science Fair Projects for posting on the Virtual Science Fair contest.
    - Mathematics — research and spreadsheets for graphing and charting data.
    - Physical Educ. — worked on creating materials for their Active Health Units.
    - Outdoor Educ. — research on animals and the estuary.
    - French — research (French speaking countries), creating slide shows, and e-mailing pen pals.
- Time was spent helping staff with:
    - E-mail skills;
    - Web page building; and
    - Grade machine trouble shooting to help with organizing and delivery of marks.

• Senior School Example

- The CIT program has assisted another successful semester as teachers begin to to integrate technology with their curriculum. Through CIT time release, teachers and students were supported in a number of ways;
- By encouraging teachers to to use technology to support the range of students' learning styles through the use of word processing and other presentation software. All Grade 10 classes completed a multimedia presentation using Powerpoint.
- All English 11 and 12 students were provided the opportunity to use Labs throughout the second semester. This enabled students to word process for essay writing and make use of alternate methods for for submitting assignments through e-mail.
- Detailed instructional sheets for using software were made available as an additional means of support for teachers. Teachers were instructed on how to provide class outlines and schedules to their students through the use of e-mail and the school web site.

3.5 Robron School/Centre

During the visitation period in January 2006, the Robron School/Centre was in transition as various schools, centres, and services were relocating to the Robron School. At the time of the visitation all of the following had recently relocated and Student Services were moving in soon. Student Services was visited in their offices on the grounds of the Phoenix Middle School.

At the time of the visit, the concept of the Robron School/Centre was evolving and the school was undergoing some renovations and other modifications. Some very complex and expensive technology for computer managed learning and special needs were observed. Technology was certainly an integral part of the following areas:

- Adult and Continuing Education Centre;
- eBlend School;
- Student Services Centre;
- first nations Publication Centre; and
- Elm Alternate School.

The **Adult and Continuing Education Centre** provides student access to computers for word processing, the Internet and other course applications at the Centre. The Pathfinder Learning System supports student learning through self-paced programs.

The **eBlend School** serves students who work from their home. The School supplies students with computers to be used in their home. At the elementary level, parents use the computers to communicate with eBlend teachers. Each family/student(s) communicates biweekly. Middle level and senior level students use the computers as part of learning such as:

- word processing;
- powerpoint;
- Internet research; and
- accessing curriculum materials.

The **Student Services Centre** has used a variety of simple and very complex technologies to support student learning where individual students have special needs. The Centre recognized the potential of technology to address student special needs many years ago. For example, the Centre adopted laptop computers for all teaching staff a number of years ago and teachers have obtained the necessary skills to utilize this technology in areas such as:

- e-mail;
- record keeping;
- powerpoint;
- specialized special needs software; and
- IEP software.

In addition, depending on the responsibilities and assignments of individual teachers, there con be a large list of other low technologies and very complex technologies used by an individual teacher, such as:

- Boardmaker;
- software for high technology communication devices;
- Discover Switch software;
- Kurzweill equipped student laptop computer packages;
- Co-writer and other word prediction software; and
- scanner software to create adapted talking books.

In addition, many computer peripheral devices are used by individual teachers, such as:

- scanners;
- printers;
- digital cameras;
- external hard drives; and
- digital video cameras.

The First Nations Education Department has all language teachers with access to computers at work and home. These are used for:

- e-mail;
- Internet research; and
- curriculum planning and development.

The **First Nations Publications Centre** at the Robron School/Centre was very impressive, using computer publishing technology for the development of First Nations student and teacher curriculum materials that are not available. These materials are of high quality and relevance because of the languages and heritage content. Interest in these materials from other school districts has resulted in external sales.

Other means to increase First Nations language and heritage resources are being explored with such technologies as:

- laptop computers;
- digital projectors; and
- a First Nations web site.

The **Elm Alternate School** emphasizes human interaction with students. Students seldom use computers except for word processing or the occasional course assigned research on the Internet. The teachers have access to computers for areas such as student records and completion of IEPs .

3.6 Innovative/Pilot Education Technology Projects

There are a number of District/school innovative/pilot education technology projects proposed, approved for implemented, or implementation is underway. These projects are all using advanced education technology to improve some aspect of teaching and learning. These projects are to be applauded for the potential new education areas they will advance. There are four projects identified here for comment:

- the LINUX Labs Project;
- the Mathematics and the Connected Learner Project;
- the Teacher Desktop Computer Project; and
- the Student Laptop Projects.

LINUX Labs Project

Of all the topics that were discussed during the review period, none came up more frequently than the LINUX labs. A couple of years ago, a computer lab at an elementary School was due to be replaced, however, funding was a major problem. After doing some research, it was determined that perhaps a bootable LINUX lab would be appropriate.

After investigation, and some trial and error, the first lab was setup. Because it was LINUX, you could not run the MS Office package or the Clarisworks package, rather one would use the Star Office package. A web browser was available, with all the standard plug-ins. E-Mail was possible, and a variety of other games and programs were installed. Printing and networking was available, and files are stored to the server, so students didn't have to use disks.

Since that first LINUX installation, a number of other schools have been similarly equipped. The District is to be applauded for their effort to pilot the LINUX terminal server lab environment. This project should not be scrapped, rather enhanced with some additional education technology tools to make the school lives of teachers and students easier. Further, more research and testing should be completed to determine where these labs are best utilized, and where their benefits and potential are greater. There will be six LINUX labs installed in elementary schools by the end of the 05 - 06 school year.

Mathematics and the Connected Learner Project

The goals of this Project are to:

- further develop the on-line delivery model for teaching curriculum to rural and remote sites using both asynchronous and synchronous tools; and
- develop e-learning skill sets and support structures for teachers and students.

The District is to be applauded for this leading edge project and in collaboration with:

- School District 71 (Comox Valley);
- School District 84 (Gold River); and
- School District 85 (Vancouver Island North).

This Project will develop three different on-line structures within an integrated environment to teach the Senior Mathematics (Principles of Mathematics and Essentials of Mathematics) 10, and 11 curriculum through a distance delivery model. The three structures include:

- streaming video;
- live virtual classroom tutorials; and
- database development for on-line student review and practice integrated within the WebCT environment.

Implementation of this Project is underway. The implementation schedule is:

- September 2005 to January 2006, Principles of Mathematics 10;
- February 2006 to June 2006, Principles of Mathematics 11;
- September 2006 to January 2007, Essentials of Mathematics 10; and
- February 2007 to June 2007, Essentials of Mathematics 11.

Teacher Workplace Desktop Computer Project

This innovative Project was approved on December, 2005 by the District Board of School Trustees and the District Teachers' Association. The Project involves the Board providing 350 computers and software for teachers to use in the workplace.

The implementation schedule of this Project is:

- prior to August 31, 2006 175 computers will be installed; and
- prior to June 30, 2007 175 computers will be installed.

It is admirable that the District is providing a teacher workplace desktop computer workstation for teachers throughout the District. This is a good step toward supporting computer technology integration throughout the District.

Student Laptop Projects.

At the Middle school level, Laptop Project planning has been initiated. These are leading edge Projects where preliminary research studies from the U.S. and Canada indicate that expected results may include:

- student achievement scores improve;
- absence rates decline;
- collaborative, project-focused work increases; and
- 21st Century skills (ICT) improve.

Preliminary Implementation of these Projects is underway in two middle schools. One school will equip two classes of students and teachers with laptop computer and software availability on a one to one basis. The other school will equip the school with mobile carts equipped with laptop computers that can be moved throughout the school.

At the time of the visitation in January 2006, the schools were planning purchases, procedures, and policies with an expected startup of September 2006.

3.7 Education Centre and Library Services

The Education Resource Centre and Library Services program is one of the many highlights of the District. A walkthrough and discussion with some staff indicated that Campbell River has one of best District Resource Centres in the Province, providing excellent services to schools and staff.

The School Library collection in all schools is automated and provides all of the standard library automation features including circulation, OPAC, cataloguing, authority control, inventory, and reporting. Students and staff have access to a web based program for searching the library collection in the school and at home.

The District, through the Education Resource Centre and as a member of the B. C. Educational Resources Acquisition Consortium has purchased a three year license to both Thompson Gale (Infotrac) and the Encyclopedia of BC. As a member of the Consortium, the District can obtain considerable savings on provincially negotiated prices for texts, videos, etc. The Alberta Education (Department of Education) Learning Resources Branch is another one of these sources through an agreement between the British Columbia and Alberta governments.

Library cataloguing is centralized in the District Education Centre and Library Service Department. The District employs a District Teacher-Librarian, although the person was away on a leave-of-absence during the Technology Review visitations in January 2006. Two library clerks work on a part-time basis each week to process and catalogue all new acquisitions. There are distinct advantages to this system as it insures clear standard cataloguing standards and reduces duplication at all School Libraries. This is one component of the library automation program that is working very well. The Education Resource Centre includes services such as:

- centralized purchasing and cataloguing of School Library materials;
- maintains holdings on an online web based program for searching the library collection in the school and at home;
- involved as a member of the B.C. Educational Resources Acquisition Consortium involved in the provincial bulk acquisition of resources;
- liaison and communication with all Schools, School Libraries and Departments;
- loan library of professional development materials, reports and Journals;
- loan library of resources such as videos and kits; and
- loan of audiovisual and digital technologies.

3.8 School Libraries

The District has continued to support School Libraries and Teacher-Libraians, where most districts across Canada have eliminated or significantly reduced the staff and/or collection investment in this area (Ken Haycock, 2003).

The District is applauded for their continued support and foresight in supporting School Libraries and staff in this area. School Libraries and Teacher-Libraians are available in all schools. The FTE time allocated for each school varies with Secondary and Middle School Teacher Librarians typically allocated as 0.5 FTE and the Elementary Schools allocated from 0.4 to 0.2 Teacher-Librarian time.

Library clerks are also available to support the Teacher-Librarian and the school, but are often assigned at different times from when the Teacher-Librarian is assigned, primarily to insure more complete coverage of the school libraries.

Generally Teacher-Librarians support the use of technology in the School Libraries.

The School Library collection in all schools is automated and provides all of the standard library automation features including circulation, OPAC, cataloguing, authority control, inventory, and reporting. Students and staff have access to a web based program for searching the library collection in the school and at home.

A number of years ago the District Gateway system from Meriwether which provides a centralized union catalogue model that runs on the District AS400 server. All schools connect to the central District server. Teacher-Librarians and Library Clerks have access to the management system on designated administration systems in most schools and there are a number of workstations allocated in each school to the Online Public Access Catalogue (OPAC). In most cases the library administrative systems are more current technology.

Some school libraries had developed web pages.

3.9 Software, Hardware, and Network Infrastructure

In general, the technology Software and Hardware indicator and Infrastructure indicator from the School Technology Stage of Integration, Development, and Implementation assessment for the District were both rated very high by District school staff.

In addition, the infrastructure Review Consultant indicated that the:

> "Campbell River Schools has some remarkable infrastructure to support the technology within it's schools. Campbell River Schools has teamed with PLNet to provide network infrastructure, as well as Campbell River Community Network (CRCN) and Campbell River TV (CRTV). These partnerships have been invaluable to the support of the schools.

Historically the schools have had mixed platforms, some Windows-based, some Macintosh-based, and all are utilized by staff and students everywhere.

Many excellent ideas have been presented and incorporated within the schools, and there are pockets of extraordinary accomplishment in many schools. Campbell River Schools should be proud of where they have come from, and where they are going."

In addition,

"Rarely has this writer seen such well-designed wiring. Each wiring closet is clean, relatively spacious, and laid out very elegantly, yet simply.

Generally speaking, organizations tend to wire all of the termination points to the top portion of the rack, and all the network gear directly below. Then there is an absolute mess of wiring that connects the two together.

The Campbell River School's method is quite a bit superior. They have chosen to interleave the termination points and the switches, such that only an 18 inch patch cable is required from each switch to it's associated termination point. This allows for a neat and tidy rack, and allows technicians and other employees to very easily track down where the wiring is terminated.

The wiring is an excellent example of how it should be done, and the electrician responsible for it's design, should be commended."

3.10 Technical Support Services

The technology Technical Support Services indicator from the School Technology Stage of Integration, Development, and Implementation assessment for the District was not rated very high by District staff.

In contrast to these findings, the Infrastructure Review Consultant found the area of technical support encompasses a number of systems and processes. The Tech Department is doing some extraordinary work, given the resources at hand. Rarely has this reviewer met a group of individuals who are able to come together as a team, for the benefit of their schools. Each member of the team has a heart to do an incredible job, and find whatever ways possible to bring improvements to the system for District staff and students.

The Tech Department has a very dedicated, knowledgeable, and personable staff who have a real desire to provide the best service possible to District staff and students.

3.11 Support Staff

The technology Role of Non-Teaching Staff indicator from the School Technology Stage of Integration, Development, and Implementation assessment for the District was rated very high by District school staff.

The overall average for all schools is 3.5, that is between Stage three (MEDIUM) and Stage Four (HIGH). In general terms, the District Role of Non-Teaching Staff rating by School staff exceed **Stage Three (MEDIUM)** where the stages are defined as:

- secretary(s) uses advanced features of student records and reporting software, word processing software and implements computer accounting;
- other non-teaching staff have access to computer technology; and
- custodial/maintenance staff use electronic mail for District communications.

With the District Role of Non-Teaching Staff rating well on the way towards **Stage Four (HIGH)** where:

- secretary(s) coordinates and maintains student records;
- secretary(s) uses advanced features of student records, reporting and word processing software;
- secretary(s) maintains computer accounting;
- support staff have convenient access to computer technology as appropriate and use e-mail to communicate within the District; and
- custodial/maintenance staff use electronic mail for District communications, work orders, supplies, budget, work schedules and monitoring school security.

3.12 Administrative Uses of Computers

The technology Role of Non-Teaching Staff indicator from the School Technology Stage of Integration, Development, and Implementation assessment for the District was rated very high by District school staff.

The overall average for all schools is 3.5, that is between Stage three (MEDIUM) and Stage Four (HIGH). In general terms, the District Role of Non-Teaching Staff rating by School staff exceed **Stage Three (MEDIUM)** where this stage is defined as:

- secretary(s) uses advanced features of student records and reporting software, word processing software and implements computer accounting;
- other non-teaching staff have access to computer technology; and
- custodial/maintenance staff use electronic mail for District communications.

With the District Role of Non-Teaching Staff rating well on the way towards **Stage Four (HIGH)** where this stage is defined as:

- secretary(s) coordinates and maintains student records;
- secretary(s) uses advanced features of student records, reporting and word processing software;
- secretary(s) maintains computer accounting;
- support staff have convenient access to computer technology as appropriate and use e-mail to communicate within the District; and
- custodial/maintenance staff use electronic mail for District communications, work orders, supplies, budget, work schedules and monitoring school security.

Additional information from surveys and interviews indicated that administrative uses of computer technology was rated very high. Major uses are in areas such as:

- general communication via paper and electronic means using word processing, spreadsheets, graphing, and presentation software;
- Most School Administrators have laptops and use technology regularly for administrative tasks.

- student records and library automation using the Comprehensive Information Management for Schools software (CIMS) on the District computer, an AS/400;
- e-mail, list services, and web sites hosted by the Campbell River Community Network (CRCN);
- computer generated report cards; and
- District and some school web sites.

4. Recommendations for Improvements

There were a number of key recommendations for education technology improvements identified by the External Education Review Team. These are:

- Provincial, District, and Schools Goals Alignment;
- Overall District Stage of School Technology Development;
- Elementary Schools Stage of School Technology Development;
- Middle Schools Stage of School Technology Development;
- Senior Schools Stage of School Technology Development;
- Student Learning and Achievement;
- ICT and Curriculum Integration;
- Pro-D, Inservice, and Training;
- Equity, Funding, and Total Cost of Ownership;
- Innovation/Pilot Education Technology Projects;
- Robron School/Centre;
- Education Resource Centre and Library Services;
- School Libraries;
- Software, Hardware, and Network Infrastructure;
- Technical Support Services;
- Administrative Uses of Computers;
- Management and Leadership; and
- Annual Three Year Education Technology Plan.

4.1 Provincial, District, and Schools Goals Alignment

At one time, implementing educational technology in British Columbia had a clear vision, goals and actions. This began with the release in 1995 of the five year plan, *Technology in British Columbia Public Schools — Report and Action Plan: 1995 to 2000*.

The alignment between Provincial, District, and School education technology vision, goals, and actions was high. This was followed by a second plan, *Information Technology: Plan for 2000 and Beyond,* released in draft form for discussion in 1999.

This alignment of direction gradually diminished in the early 2000s. There were many reasons for this decline, perhaps the decline was due to fiscal restraint followed by changes in priorities and specifically to a decline in Provincial education technology leadership and direction.

Today, there is a lack of clarity in the general direction and importance of education technology at the Provincial level and this is also reflected in the Campbell River School District and schools. For example, the reviewers found from the Teachers Survey that questions dealing with the teaching of Information and Communication Technology (ICT) student outcomes that there was a lack of

clarity of direction in this area. Answers to the following selected questions confirm this view:

- **Question # 16. What is your awareness level of ICT Outcomes for your teaching assignment?**

  - Very Low 17 %
  - Low 24 %
  - Neither low nor high 27 %
  - High 10 %
  - Very High 3 %
  - Don't Know 20 %

  NOTE: Only 13 % of teachers have a high or very high awareness of ICT Outcomes; while 61 % considered their awareness level very low, low, or do not know,

- **Question # 17. What is your technology skills level for implementing the ICT outcomes for your teaching assignment?**

  - Very Low 12 %
  - Low 18 %
  - Neither low nor high 30 %
  - High 17 %
  - Very High 6 %
  - Don't Know 17 %

  NOTE: Only 23 % of teachers have a high or very high skills level for implementing the ICT Outcomes; while 47 % considered their skills level very low, low, or do not know.

- **Question # 18. How appropriate is the software provided by the Authority for ICT implementation for your teaching assignment?**

  - Very Low 9 %
  - Low 17 %
  - Neither low nor high 17 %
  - High 12 %
  - Very High 4 %
  - Don't Know 41 %

  NOTE: Only 16 % of teachers believe that the software provided is highly appropriate to implement the ICT Outcomes; while 67 % considered the software very low, low, or do not know. The do not know response of 41% is very high.

- **Question # 19. How appropriate is the hardware provided by the Authority for ICT Outcomes for your teaching assignment?**

  - Very Low 12 %
  - Low 18 %
  - Neither low nor high 14 %
  - High 10 %
  - Very High 4 %
  - Don't Know 42 %

  NOTE: Only 14 % of teachers believe that the hardware provided is highly appropriate to implement the ICT Outcomes; while 72 % considered the hardware very low, low, or do not know. The do not know response of 42 % is very high.

There does not appear to be any Provincial direction, goals, plan, or funding for education technology. This situation provides local flexibility, decisions, and opportunities at the District and Schools levels, but it also has the potential for chaos, neglect, lack of direction and lack of funding. The interviews of District teachers indicated that there was a greater degree of education technology goals and resources clarity in previous years from the Ministry and the District, but this has diminished.

Perhaps there is a renewed recognition at the Provincial level of education technology, but the language is not clear. For example, In the recent *Speech from the Throne*, February 14, 2006 the Government stated that:

> "How can we better help those with special needs, in public schools and independent schools alike?"
>
> Page 18

> "How might we modernize our curriculum to ensure it offers relevant instruction for the modern world? What changes might be made?
>
> Page 18

In addition, in the recently released Ministry of Education, *2006/07 — 2008/09 Service Plan*, the following statement was made in terms of the'strategic context' as a factor that could potentially affect the Ministry's ability to achieve its goals:

> **"Technology** — New developments in the use of information technology to deliver education have improved access to quality teaching for all students, especially those in rural areas of the province. Improvement in information technology also allows the Ministry and its partners to make better use of data through implementation and utilization of data management

systems, such as the British Columbia Enterprise Student Information System (BCeSIS). However, the rapid pace of technological advances poses a challenge for educators in keeping abreast of the latest technology. Also, the expenses associated with technological training, updating software and upgrading equipment may place a strain on educational budgets."

In addition, other statements dealing with key strategic issues and the focus for the next three years indicated the terms 'computer skills' in terms of literacy for all citizens and 'education technology' for students with special needs were:

"**Literacy** — As outlined in the Government's Five Great Goals, literacy will continue to be a key issue for the Province, and for the Ministry of Education. For the Province to move forward with its social and economic agenda, all citizens must be literate. Results from the latest Statistics Canada *International Adult Literacy and Skills Survey* indicate that although British Columbia, along with the Yukon, Alberta and Saskatchewan, had average scores that were significantly higher than the national average in all four of the literacy domains tested, 40 per cent of adults in B.C. scored below the desired proficiency level for "prose literacy." Given the complex nature of daily life, and the reduced earning potential of people with low rates of literacy; reading, writing, numeracy, and computer skills are essential for full participation in society."

and

"Special Needs — A key area of focus for the Government will be the most vulnerable population in our society — including children and youth with special needs, children and youth at risk, and those with addictions or problematic substance abuse. Often, these vulnerable citizens face barriers that prevent them from achieving success, or participating fully in society. The Ministry of Education will work in partnership with other social development Ministries to remove barriers,13 and to provide integrated, citizen-centred service delivery. As well, the Ministry will expand educational technology and provide additional supports for students with special needs."

The Ministry's strategies for improving literacy include:

"To work in partnership with the Ministry of Children and Family Development and the Ministry of Health to improve early learning (through programs such as Ready, Set, Learn, which is designed to improve the school readiness of three-year-olds)."

and

> "Provide $1.8 million in new provincial funding to support library services and improve child and adult literacy. This funding is part of the Province's $12 million investment over three years to implement the *Libraries Without Walls* strategic plan (this plan outlines the commitment to provide broadband Internet into every library branch, to provide a 24 hour virtual reference desk, and to set up a One Card system to increase access to library information)."

Comments and statements such as the above, do not amount to a plan. The clarity of the directions and the alignment between Provincial, District, and School levels continues to be difficult to understand.

It is recommended that:

1. **... the current and new Provincial directions for education technology be frequently monitored and clarified for District education technology planning, funding, and implementation implications.**

2. **... the District strongly urge the Ministry to provide education technology clarity in the form of a Provincial three year Education Technology Plan with a vision and clear measurable goals for Information and Communication Technology (ICT) student outcomes, ICT curriculum integration, and how these will contribute to the success of the Ministry goals for 2006/07 to 2008/09.**

3. **... with or without the Ministry clarity, the District needs to clarify and provide their own vision, measurable goals, and direction for education technology as this clarity does not appear to be coming from the Provincial level.**

4.2 Overall District Stage of School Technology Development

All schools were asked to complete a school self-assessment of their stage of technology integration, development, and integration. Only the schools selected for validation visits are included in this Report. This instrument facilitated the self-assessment of each school using four stages of development and nine indicator areas to determine the stages of integration, development and implementation. The stages are:

- Stage One — early technology development;
- Stage Two — low technology development;
- Stage Three — medium technology development; and
- Stage Four — high technology development.

In addition, nine indicators were used:

- Student Access and Use;
- Teacher Access and Use;
- Planning and Leadership
    - School level, and
    - District level;
- Software and Hardware;
- Infrastructure/Networking;
- Technical Support;
- Professional Development;
- Non-teaching Staff; and
- Funding.

The overall average for all schools is 2.5, that is between Stage Two (LOW) and Stage Three (MEDIUM). In general terms, the District schools exceed **Stage Two (LOW)** where:

> "Stage Two has more teachers beginning to learn about computer technology and student access increases to a weekly basis. Some teachers are integrating computer technology into some subject areas. As hardware and software are upgraded, there is a mixture of old and new computer technology. Professional development opportunities increase but the focus is still on hardware and software."

With the District schools well on their way towards **Stage Three (MEDIUM)** where:

> "Stage three computer technology becomes a regular tool for learning and for teaching when they are located in all classrooms and learning locations. The school has a local area network and the focus shifts to integrating computer technology into subject areas. Planning for computer technology is an ongoing component of school planning. "

Also, four indicator areas were found to be rated consistently the highest. These areas were:

- Student Access and Use;
- Teacher Access and Use;
- Infrastructure;
- Software and Hardware; and
- Non-teaching Staff.

The average results for the stages of development for the District were calculated for each indicator and a District Profile Graph was charted (see next page).

The Elementary, Middle, and Senior school profile summaries were weighted equally in this calculation. That is, all Elementary Schools, all Middle Schools, and all Senior School summaries had an equal weighting of 1/3, 1/3, and 1/3.

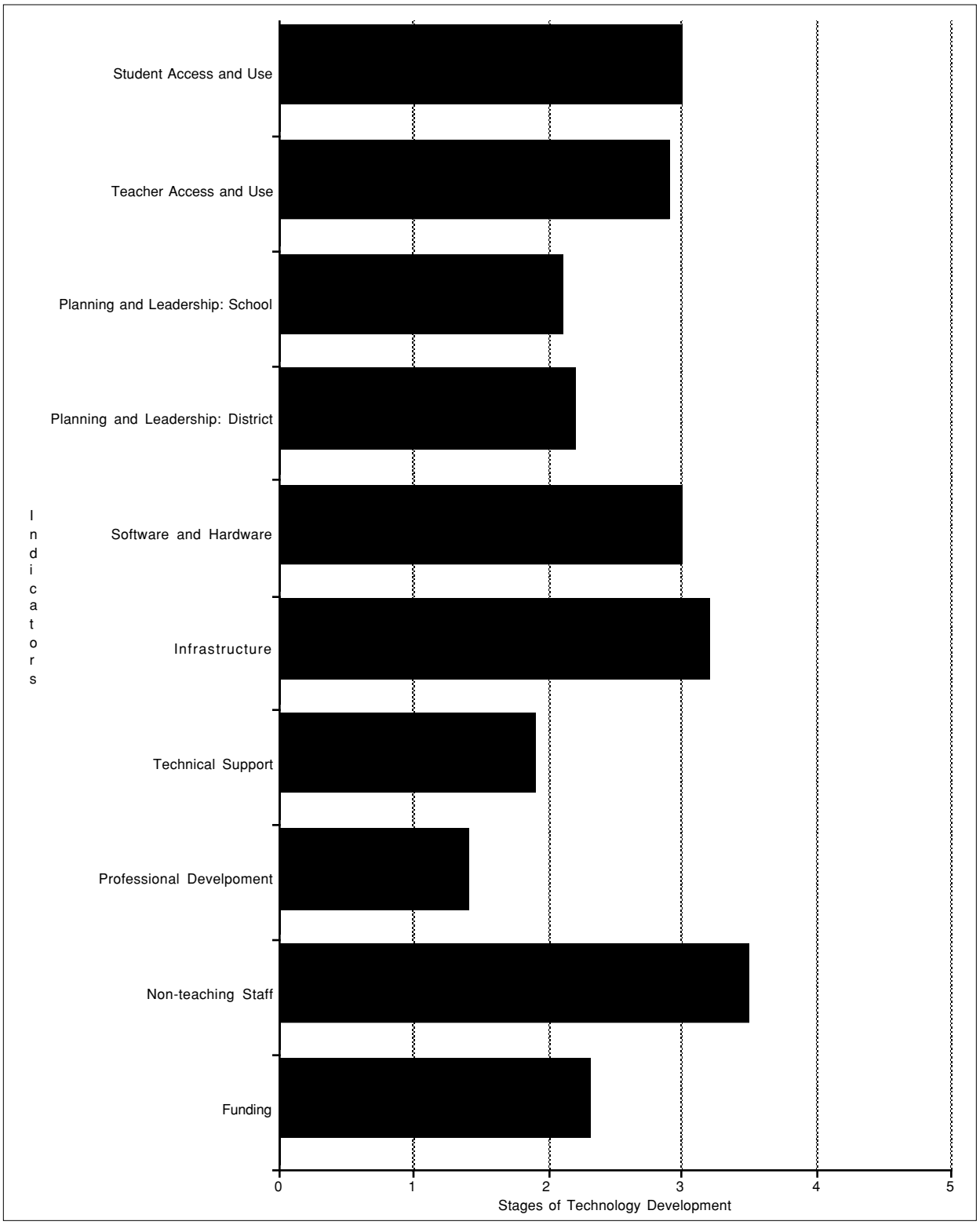
An interpretation of this graph (see next page) indicates that the District Graph for all selected Elementary, Middle, and Senior schools is at the stage of technology development of:

- an average Stage of development of 2.5 and
- with a range from Stage 1.4 to Stage 3.5.

In general, the following observations were made about the similarities, differences, areas for improvement, and accomplishments among the indicators of technology development:

- **Similarities** (defined as less than a range of one stage of development):
  - Infrastructure and
  - Technical Support.
- **Differences — Improvement Areas** (defined as a range of about one stage of development):
  - Planning and Leadership (District) and
  - Professional Development.

Profile Graph of the Average Technology Stage of Integration, Development and Implementation for all District Schools



- **Major Differences — Improvement Areas** (defined as a range over one stage of development):
    - Student Access and Use;
    - Teacher Access and Use;
    - Planning and Leadership (School);
    - Software and Hardware;
    - Non-teaching Staff; and
    - Funding.

It is recommended that:

4. ... the District plan to improve the overall schools stage of technology development from the present stage of 2.5 to stage 3.5 or higher over the next three years.

4.3 Elementary Schools Stage of School Technology Development

The summary Graph of the School Technology Stage of Integration, Development, and Implementation for the Elementary Schools is on the following page.

An interpretation of this graph indicates that the elementary schools profile is at the stage of technology development of:

- an average Stage of development of 1.9 and
- with a range of from Stage 0.9 to Stage 3.0.

Some indicators are approaching MEDIUM, reaching between Stage Two (LOW) and Stage Three (MEDIUM) with respect to:

- Infrastructure and
- Non-teaching Staff.

Most other indicators were much lower at between Stage One (EARLY) and Stage Two (LOW) with respect to:

- Student Access and Use;
- Teacher Access and Use;
- Planning and Leadership at the District Level;
- Planning and Leadership at the School Level;
- Software and Hardware;
- Technical Support;
- Professional Development; and
- Funding.

One indicator was very low at below Stage One (EARLY) with respect to:

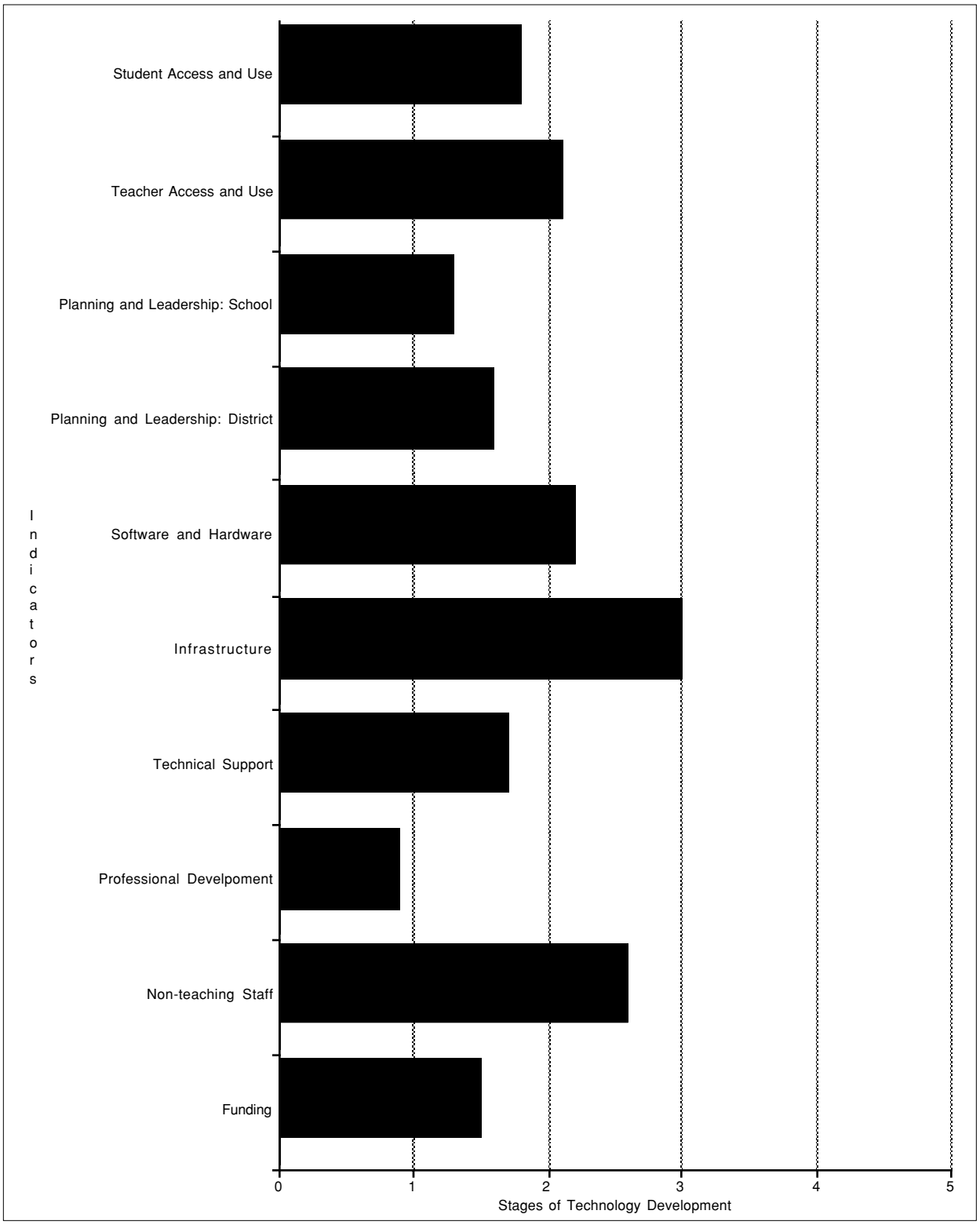
- Professional Development.

These findings can be used for education technology planning, action, improvements, and baseline levels for future evaluations for all District Elementary schools with respect to improving the stage of school technology integration, development, and integration.

It is recommended that:

5. ... the District plan to improve the overall Elementary schools stage of technology development with the priority given to those indicators at the lowest level over the next three years.

Profile Graph of the Technology Stage of Integration, Development, and Implementation for the Elementary Schools



4.4 Middle Schools Stage of School Technology Development

The summary Graph of the School Technology Stage of Integration, Development, and Implementation for the the Middle Schools is on the following page.

An interpretation of this graph indicates that the middle schools profile is at the stage of technology development of:

- an average Stage of development of 3.0 and
- with a range from Stage 2.0 to Stage 3.9.

Some indicators are approaching (HIGH), reaching between Stage Three (MEDIUM) and Stage Four (HIGH) with respect to:

- Student Access and Use;
- Teacher Access and Use;
- Software and Hardware;
- Infrastructure;
- Technical Support; and
- Non-teaching Staff.

All other indicators are lower at between Stage Two (LOW) and Stage Three (MEDIUM) with respect to:

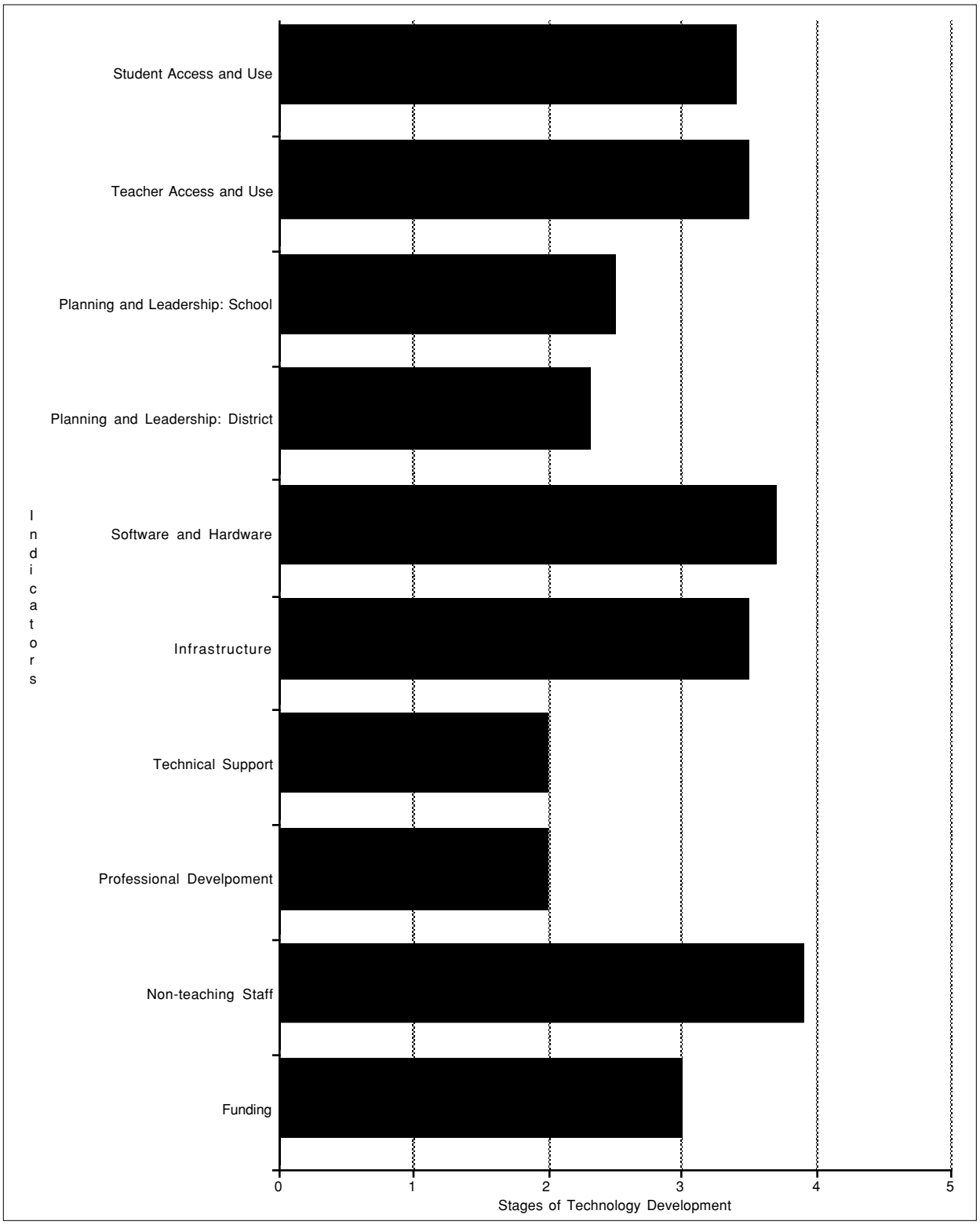
- Planning and Leadership at the School Level;
- Planning and Leadership at the District Level;
- Professional Development; and
- Funding.

These findings can be used for education technology planning, action, improvements, and baseline levels for future evaluations for all District middle schools with respect to improving the stage of school technology integration, development, and integration.

It is recommended that:

6. ... the District plan to improve the overall Middle schools stage of technology development with the priority given to those indicators at the lowest level over the next three years.

Profile Graph of the Technology Stage of Integration, Development, and Implementation for the Middle Schools



4.5 Senior Schools Stage of School Technology Development

The summary Graph of the School Technology Stage of Integration, Development, and Implementation for the Senior Schools is on the following page.

An interpretation of this graph indicates that the senior schools profile is at the stage of technology development of:

- an average Stage of development of 2.6 and
- with a range of from Stage 1.3 to Stage 4.0.

One indicator was very high reaching Stage Four (HIGH) with respect to:

- Non-teaching Staff.

Most indicators were approaching MEDIUM, at between Stage Two (LOW) and Stage Three (MEDIUM) with respect to:

- Student Access and Use;
- Teacher Access and Use;
- Planning and Leadership at the School Level;
- Planning and Leadership at the District Level;
- Infrastructure;
- Software and Hardware; and
- Funding.

Two indicators were low at between Stage One (EARLY) and Stage Two (LOW) with respect to:

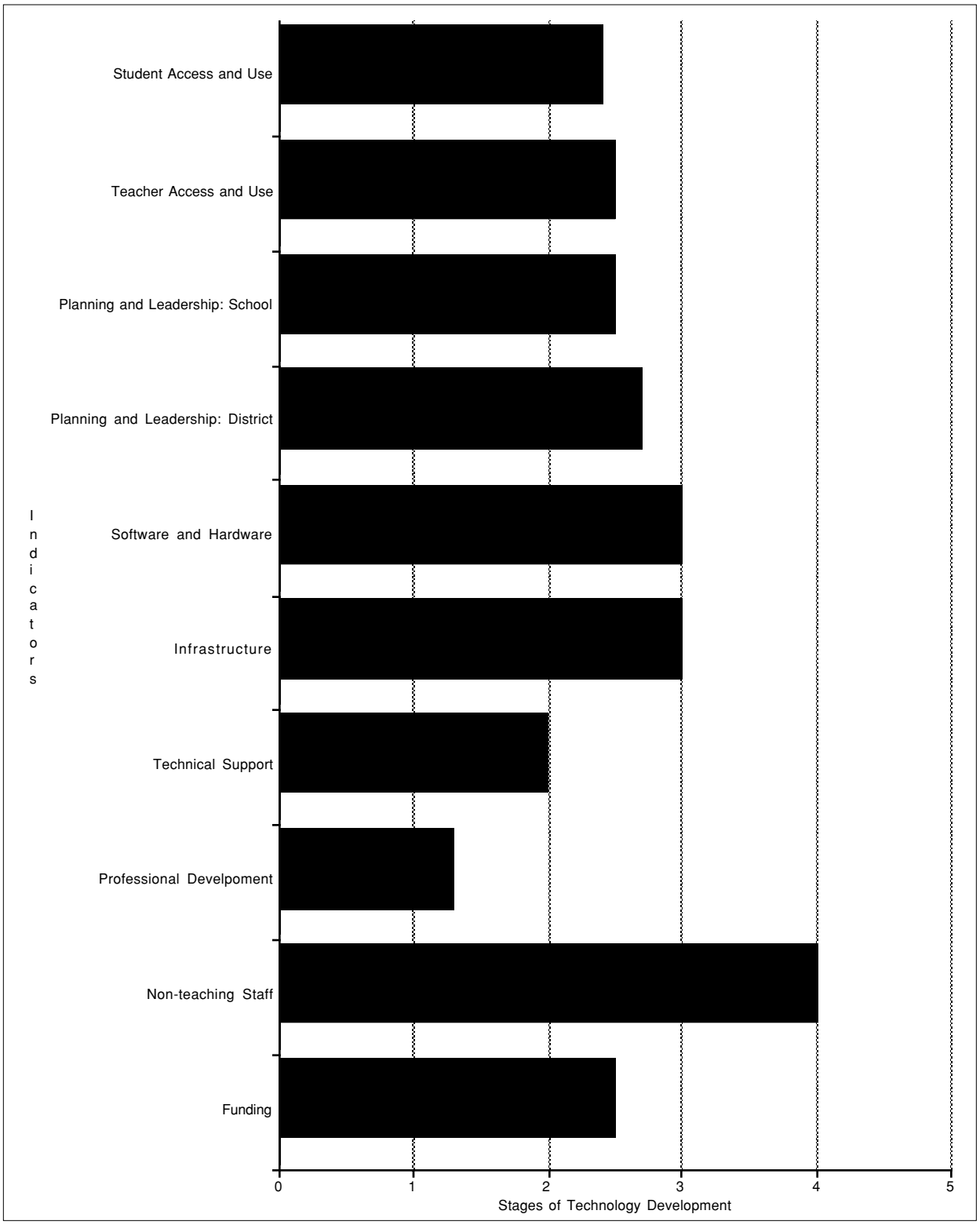
- Technical Support and
- Professional Development.

These findings can be used for education technology planning, action, improvements, and baseline levels for future evaluations for all District senior schools with respect to improving the stage of school technology integration, development, and integration.

It is recommended that:

7. ... the District plan to improve the overall Senior schools stage of technology development with the priority given to those indicators at the lowest level over the next three years.

Profile Graph of the Technology Stage of Integration, Development and Implementation for the Senior Schools



4.6 Student Learning and Achievement

The most important reason for using education technology in the teaching and learning of all curricula outcomes is to improve student learning and achievement.

There is little documented evidence that the reviewers could find to confirm that education technology is improving curricula outcomes and student achievement in the District in a major way. This does not mean that this is the case, only that there is little evidence to confirm that this is actually happening in a major way.

It should be noted that there are a number of positive District and School examples of the use of education technology to improve student learning and achievement. Most CITs Project Reports have evaluation measures of student achievements. These examples are the work of small groups or individuals and do not represent an overall District effort.

If the goal of the District is to use technology to improve student learning and achievement, then it is logical that the focus of technology funding should be toward purchasing computer technology and software resources for students and teachers most in need, that is, for the special education students needs and for support of younger students in the development of literacy and numeracy skills.

Therefore, the District must decide what the priorities should be to achieve If the goal of the District to use technology to improve student learning and achievement. As a suggestion, this priority could be in the following order:

- Elementary Special Education – Learning Assistance Rooms.
- Primary Students and Intermediate Students.
- School Libraries.
- Middle School Special Education.
- Secondary Special Education and Special Programs.
- All other programs.

The above would require a significant paradigm shift for the District, the type of paradigm shift that would require strong leadership and a strong commitment. It takes a long time for educational institutions to engage in dramatic paradigm shifts and educational change.

In Districts that are moving toward the above priorities, successful computer technology programs at the middle and senior levels are already in place, thus not requiring a massive paradigm shift. Technology then becomes more equitably distributed, but with only an increased emphasis on special education and elementary computer technology programs.

A number of years ago, it would not have been logical to propose this paradigm shift toward computer technology as a tool for improving student learning and

achievement. This shift has been occurring over the last five to eight years. Eight to ten years ago the software applications to improve student learning and achievement were neither as prevalent nor available as today.

There was some evidence that the reviewers found that was of concern with respect to the use of education technology to improve student learning and achievement. For example, the reviewers found from the Teachers Survey that questions dealing with how computers and information technology are used by teachers for ICT outcomes, curricular outcomes, and student achievement indicated a very low awareness and/or utilization level.

Answers to the following selected questions from teachers confirm this view:

- **Question # 20. I regularly use computers and information technology in my teaching?**

  - Yes 48 %
  - No 40 %
  - Don't Know 1 %
  - Not Applicable 11 %

  NOTE: Only 48 % of teachers use computers and information technology in their classrooms; while 40 % do not.

- **Question # 21. I have implemented the required ICT outcomes for students in my teaching assignment?**

  - Yes 23 %
  - No 40 %
  - Don't Know 19 %
  - Not Applicable 18 %

  NOTE: Only 23 % of teachers have implemented the required ICT outcomes for students in their teaching assignments; while 40 % have not and 19 % do not know.

- **Question # 22. I regularly link student use of computers and information technology directly to the improvement of curricular outcomes and academic achievement?**

  - Very Low 37 %
  - Low 20 %
  - Neither low nor high 22 %
  - High 9 %
  - Very High 2 %
  - Don't Know 10 %

  NOTE: Only 11 % of teachers (high and very high) regularly link

student use of computers and information technology directly to the improvement of curricular outcomes and academic achievement; while 57 % did this on a low or very low basis.

- **Question # 23. Effective use of computers and information technology by students in your classroom is?**

  - Very Low 37 %
  - Low 20 %
  - Neither low nor high 22 %
  - High 9 %
  - Very High 2 %
  - Don't Know 10 %

  NOTE: Only 11 % of teachers indicated a high or very high effective use of computers and information technology by students in their classroom; while 57 % indicated this on a low or very low basis.

- **Question # 24. Effective use of computers and information technology by students in computer labs is?**

  - Very Low 16 %
  - Low 17 %
  - Neither low nor high 25 %
  - High 21 %
  - Very High 4 %
  - Don't Know 17 %

  NOTE: Only 25 % of teachers indicated a high or very high effective use of computers and information technology by students in computer labs while 33 % indicated this on a low or very low basis.

- **Question # 25. Effective use of computers and information technology by students in the library is?**

  - Very Low 22 %
  - Low 14 %
  - Neither low nor high 22 %
  - High 9 %
  - Very High 1 %
  - Don't Know 34 %

  NOTE: Only 10 % of teachers indicated a high or very high) effective use of computers and information technology

by students in the library; while 36 % indicated this on a low or very low basis. Also, 34 % indicated that they did not know.

Similarly, answers to the following selected questions from Principals and Vice-Principals confirm this view:

- **Question # 14. How appropriate is the software provided for ICT implementation?**

  - Very Low 7 %
  - Low 27 %
  - Neither low nor high 10 %
  - High 10 %
  - Very High 6 %
  - Don't Know 40 %

  NOTE: About 16 % of Principals and Vice-Principals indicated a very high or high appropriateness for the software provided for ICT implementation; while 34 % indicated this on a low or very low basis. Also, 40 % indicated that they did not know.

- **Question # 18. The teachers in this school, regularly link student use of computer and information technology directly to the improvement of student curricular outcomes and academic achievement.**

  - Yes 27 %
  - No 40 %
  - Don't Know 27 %
  - Not Applicable 6 %

  NOTE: Only 27 % of Principals and Vice-Principals indicated that teachers regularly link student use of computer and information technology directly to the improvement of student curricular outcomes and academic achievement; while 40 % have not and 27 % do not know.

- **Question # 21. Students use computers and information technology effectively in the library.**

  - Very Low 11 %
  - Low 21 %
  - Neither low nor high 18 %
  - High 36 %
  - Very High 7 %
  - Don't Know 7 %

NOTE: About 43 % of Principals and Vice-Principals indicated that students use computers and information technology effectively (high and very high) in the library; while 32 % indicated this on a low or very low basis. Also, 7 % indicated that they did not know.

This is a difficult area to make progress as there is a common myth in education that building education technology infrastructure, adding computer software and hardware, and showing teachers how to use the software and hardware will automatically result in improved student learning and achievement. Research has indicated that this does not automatically happen.

Also, within the context of teaching and learning, there is a de-emphasis on ICT skills and more of an emphasis on literacy, numeracy, language learning, writing, reading skills, design, production, etc., rather then "learning about the computer" or "computer skills". In other words, schools need to truly integrate technology into the educational environment as a learning tool.

In the United Kingdom, the ICT in Schools Research and Evaluation Series has thus far published 18 reports investigating effective use of ICT in home and school, trends in ICT usage by young people as well as school and LEA management of the NGfL program. In the latest press release (2005) from the U. K. Department for Education and Skills progress in this area was announced:

> "The evidence base which underpins the ICT in Schools program is now significant and confirms that:
>
> - ICT raises standards: *ImpaCT2*, published in October 2002, found that ICT can improve results at GCSE by the equivalent of half a grade;
> - Primary schools have achieved the Prime Minister's computer t o pupil ratio target a year early and Secondary schools are close;
> - Over 99% of schools are connected to the Internet, with an increasing amount at Broadband speeds;
> - Schools with good ICT learning opportunities enable higher pupil attainment regardless of socio-economic background;
> - Schools and LEAs managed, developed and delivered the NGfL program effectively; and
> - Leadership, resources and vision are key to the successful adoption of ICT in Schools."

■ **It is recommended that:**

8. **… the District open up a discussion and engage in a planning process to refocus the use of computer technology to support an emphasis on student learning and achievement.**

9. **… at the elementary level, the District establish a standard set of software applications that address the development of literacy and numeracy skills to improve student learning and achievement. These applications should be available at all schools and be equitably distributed throughout the District. Sample applications may include SuccessMaker Foundations Courses, Riverdeep or others.**

10 **… at the elementary level, the District establish a standard set of software applications that provide the assessment tools necessary to determine student achievement. These applications should be available at all schools and be equitably distributed throughout the District. Sample applications may include Star Early Literacy, Star Reading, Reading Fluency Monitor, SuccessMaker Results Manager or others.**

11. **… at the elementary level, the District establish a standard set of software applications that provide the productivity tools that can typically be used by elementary students but also help to provide student learning and achievement. These applications should be available at all schools and be equitably distributed throughout the District. Sample applications include Microsoft Office enhanced by Scholastic Keys, Kidspiration, Inspiration and others.**

12. **… in Learning Assistance programs, the District establish a standard set of software applications that provide the support tools that are required to address the needs of special students. These applications should be made available in all Learning Assistance areas consistent with the specific needs of each school. Sample and recommended applications are available through the SETBC PSAP program but can include applications**

such as SuccessMaker Foundation Courseware, Kurzweil 3000, Co:Writer, Write:Outloud, Wordmaker, Simon Spells It Out, and many others.

13. **… the District, as a very first priority, enhance the computer technology available to students in its Learning Assistance programs particularly in schools with the greatest need.**

14. **… the District explore the software options available and consider the implementation of an Integrated Learning System to enhance student learning and achievement. Examples include SuccessMaker Foundation Courseware, Riverdeep Mathematics, Riverdeep Language Arts, Plato and others.**

15. **... the District evaluate the progress of the use of education technology to improve student learning and achievement.**

4.7 ICT and Curriculum Integration

The integration of ICT skills with the delivery of curriculum (English Language Arts, Social Studies, Mathematics, Science, Fine Arts, etc.) is the most common use of computer technology within the District. The reviewers found many fine examples within the District of individual teachers who have successfully integrated ICT skills into the core curriculum areas. These include programs such as the Media Arts programs at both Secondary Schools, the use of word processing to support English Language Arts writing skills, the use of library automation software to provide access to library print resources, the delivery of math curriculum online, the use of animation programs to enhance fine arts programs, and ongoing online research in social studies. Examples abound within the District driven by the dedication of individual teachers.

As noted previously, there is a lack of clarity as to the intent or requirement for the development of ICT skills at the school level, particularly at the elementary level, although the reviewers found that there is an assumption that these skills either exist or are prevalent among middle and secondary students. This is not always the case. It was not uncommon for teachers to express the concern that students with computers at home commonly used these systems as "game" machines and did not necessarily come to school with the necessary ICT skills. A number of teachers perceived that the level of ICT skills among there students was quite weak and that there was a need to enhance these skills through a clearly defined ICT skills development program.

ICT skills are to a large extent the skills required to use a broad range of productivity tools including word processing software, spreadsheets, database software, digital cameras, digital video cameras, video editing software, online reference tools, the Internet, DVD players, and also include skills such as keyboarding, mouse skills, touchpad skills and many others.

ICT skills are always difficult skills to define as the required skills change as technology evolves, sometimes dramatically as new technology becomes commonly available in the marketplace. For example, the ability to use a digital camera, download to a computer and incorporate the pictures into a presentation. This software was not a clearly defined ICT skill a number of years ago. The information literacy skills required to use online resources to support research in social studies or science are also undergoing a constant evolution and require Teacher-Librarians to be particularly vigilant in helping students achieve these skills.

As noted above, ICT skills are being delivered by creative, individual teachers throughout the District, but there is a lack of clarity, a lack of clear direction and the need to define clear ICT skills that students require at specific levels. There needs to be consistency throughout the District as to the ICT skills that students require at each level to successfully use technology at each level of their school careers.

Not too many years ago, the Ministry provided direction, goals, and resources for developing Information and Communication Technology (ICT) student outcomes and the integration of these outcomes into the curriculum. Recently, this effort has lacked direction and clarity at the Ministry level and the District level.

The reviewers found from the Teachers Survey that questions dealing with the teaching of Information and Communication Technology (ICT) student outcomes and integration of ICTs into the curriculum that there was a lack of clarity of direction at the schools level. Answers to the following selected questions confirm this view:

- **Question # 16. What is your awareness level of ICT Outcomes for your teaching assignment?**

  - Very Low 17 %
  - Low 24 %
  - Neither low nor high 27 %
  - High 10 %
  - Very High 3 %
  - Don't Know 20 %

  NOTE: Only 13 % of teachers have a high or very high awareness of ICT Outcomes; while 61 % considered their awareness level very low, low, or do not know,

- **Question # 17. What is your technology skills level for implementing the ICT outcomes for your teaching assignment?**

  - Very Low 12 %
  - Low 18 %
  - Neither low nor high 30 %
  - High 17 %
  - Very High 6 %
  - Don't Know 17 %

  NOTE: Only 23 % of teachers have a high or very high skills level for implementing the ICT Outcomes; while 47 % considered their skills level very low, low, or do not know.

- **Question # 21. I have implemented the required ICT outcomes for students in my teaching assignment?**

  - Yes 23 %
  - No 40 %
  - Don't Know 19 %
  - Not Applicable 18 %

NOTE: Only 23 % of teachers have implemented the required ICT outcomes for students in their teaching assignments; while 40 % have not and 19 % do not know.

- **Question # 22. I regularly link student use of computers and information technology directly to the improvement of curricular outcomes and academic achievement?**

  - Very Low 37 %
  - Low 20 %
  - Neither low nor high 22 %
  - High 9 %
  - Very High 2 %
  - Don't Know 10 %

  NOTE: Only 11 % of teachers (high and very high) regularly link student use of computers and information technology directly to the improvement of curricular outcomes and academic achievement; while 57 % did this on a low or very low basis.

The CIT program is an excellent strategy to encourage the implementation of ICT student outcomes and the integration of technology into curriculum. Although there are many successful CIT projects that can be identified, It is time to review these projects and make the program more effective through working towards revised standard outcomes and expectations for all students and teachers, and by summarizing and using the accumulated CIT successful results, experience, and expertise across the District.

Similarly, answers to the following selected questions from Principals and Vice-Principals confirm this view:

- **Question # 12. What is your awareness level of ICT outcomes?**

  - Very Low 7 %
  - Low 25 %
  - Neither low nor high 34 %
  - High 31 %
  - Very High 3 %
  - Don't Know 0 %

  NOTE: Only 34 % of Principals and Vice-Principals indicated an ICT outcomes awareness as high or very high; while 32 % did this on a low or very low basis.

- **Question # 13. What is your technology skill level for implementing the ICT outcomes?**

  - Very Low 3 %
  - Low 23 %
  - Neither low nor high 39 %
  - High 26 %
  - Very High 6 %
  - Don't Know 3 %

  NOTE: Only 32 % of Principals and Vice-Principals indicated a skill level for implementing ICT outcomes as high or very high; while 26 % did this on a low or very low basis.

- **Question # 14. How appropriate is the software provided for ICT implementation?**

  - Very Low 7 %
  - Low 26 %
  - Neither low nor high 10 %
  - High 10 %
  - Very High 7 %
  - Don't Know 40 %

  NOTE: Only 17 % of Principals and Vice-Principals indicated that the software provided for ICT was appropriate implementation as high or very high; while 33 % did this on a low or very low basis; and 40% did not know.

- **Question # 15. How appropriate is the hardware provided for the ICT Outcomes?**

  - Very Low 13 %
  - Low 28 %
  - Neither low nor high 12 %
  - High 12 %
  - Very High 6 %
  - Don't Know 29 %

  NOTE: Only 18 % of Principals and Vice-Principals indicated the hardware provided for the ICT Outcome was appropriate as high or very high; while 41 % did this on a low or very low basis; and 29% did not know.

- **Question # 17. Have implemented the required ICT student outcomes?**
  - Yes 23 %
  - No 43 %
  - Don't Know 23 %
  - Not Applicable 10 %

NOTE: Only 23 % of Principals and Vice-Principals have implemented the required ICT outcomes for students s; while 43 % have not and 23 % do not know.

It is recommended that:

16. ... with or without the Ministry clarity, the District needs to define and update those ICT outcomes and skills that are necessary for students to successfully use technology to support learning and achievement across the curriculum.

17. ... the District continue the successful CIT program, but look at making the program more effective through working towards standard outcomes and expectations for all students and teachers, and by summarizing and using the accumulated CIT successful results, experience, and expertise across the District.

4.8 Pro-D, Inservice, and Training

In general, the technology Professional Development indicator from the School Technology Stage of Integration, Development, and Implementation assessment for the District was not rated very high by District staff. The results were:

INDICATOR	DISTRICT AVERAGE	DISTRICT RANGE
7. Professional Development	**1.4**	**0.9 — 2.0**

The Professional Development indicator was rated at a Stage One (Early) or 1.4 out of 4 Stages of technology development. The range of this rating goes from a Stage 0.9 (Early) to a Stage 2 (Low). See the graph on the next page of all District Schools to see how the rating for Professional Development compared to the other indicators.

Although there are active Pro-D, inservice, and training efforts in the District these are not rated at a high level for education technology implementation. With further discussions and interviews at the District and School levels, there was some confusion about how to rate the Professional Development Indicator.

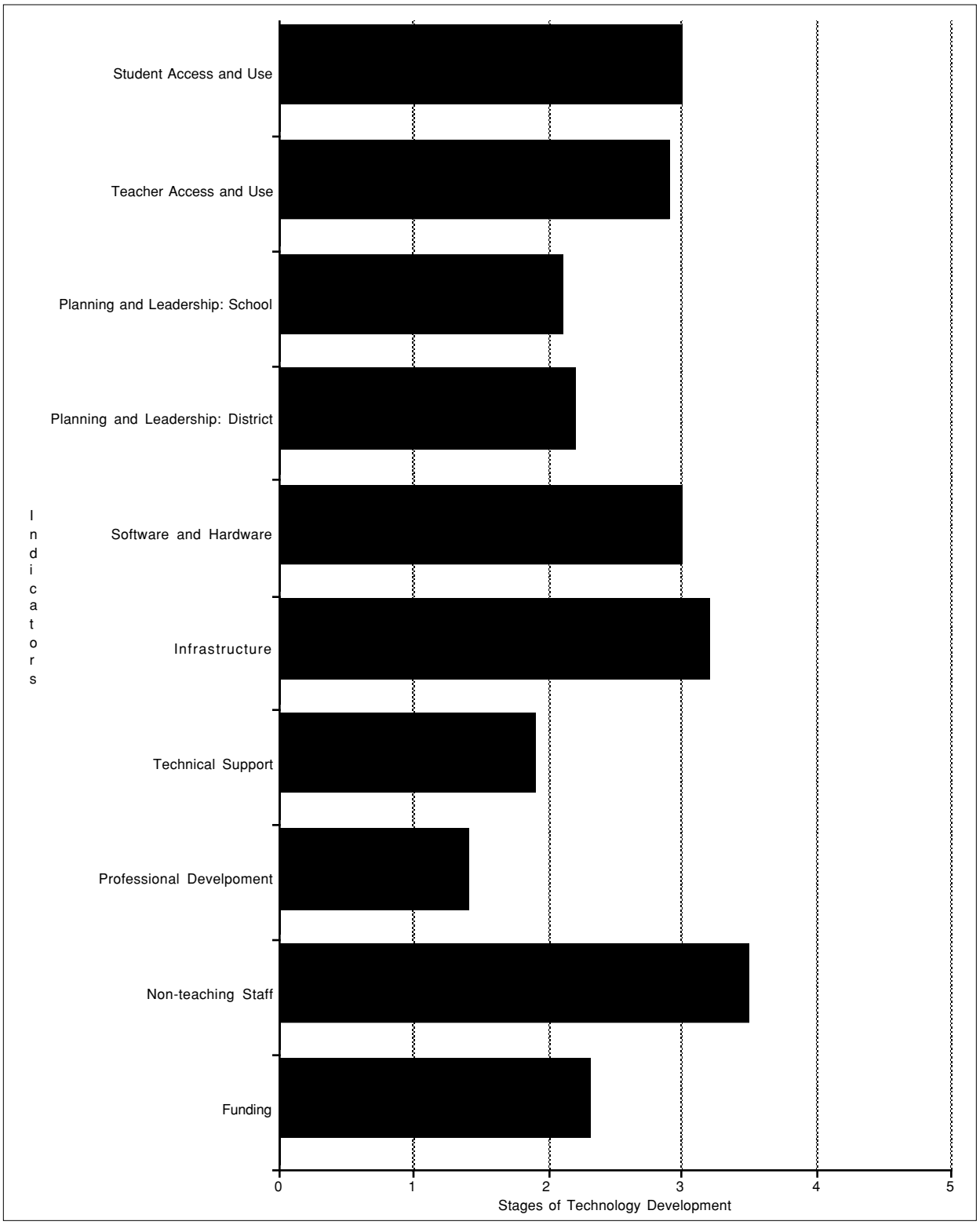
The low rating was generally given to the Professional Development Indicator because the term was associated with Pro-D activities. Also, there was the general perception that in past years, Pro-D activities did meet some needs in such areas as education technology, ICT skills, ICT integration with curriculum, and resources. In recent years, this was not the case with shifting Ministry and District priorities such as Literacy.

With further discussions and interviews at the District and School levels it was determined that the individual school Tech Contacts and the Curriculum Integration with Technology (CIT) program were very highly rated as a source of education technology professional development, inservice, and training.

To reinforce that the District has developed appropriate Pro-D, inservice, and training programs including CIT, It should be noted that recent selected findings from Alberta Learning (2004), *AISI Technology Projects Research Review: Summary of Findings from Cycle One 2000-2001 to 2002-2003 reported that*:

> "The study reviewed twenty-five medium- to high-effect size AISI (Alberta Initiative for School Improvement) technology projects as a means to understand how the use of technology might be better applied within Alberta classrooms." (p. 5)
>
> "Ninety-five AISI projects (approximately 12% of all AISI projects) focused on learning and technology, and as many as 141 (18% of

Profile Graph of the Average Technology Stage of Integration, Development and Implementation for all District Schools



total) projects included some aspect of technology." (p. 7)

"Generally, the findings of the report were:

1. The use of lead teachers who have both technological savvy and people skills improved the implementation of technology within classrooms.
2. Teachers responded positively to initiatives that helped them eliminate risks of technology not working, taught new skills that could be applied immediately, and provided opportunities to work collaboratively with other teachers.
3. The presence of physical technology resources encouraged exploration with the technologies.
4. Project-based and peer-to-peer teaching (for both students and teachers) correlated highly with project success.
5. School Web sites and e-mail helped teachers and schools communicate effectively with parents.
6. Parental support for student learning was encouraged when students' successes were shared and celebrated with parents.
7. Projects that integrated technology into regular curricula were more successful than those that tried stand-alone technological training.
8. The most effective professional development was specific to curricular needs and was embedded into the daily lives of teachers instead of being delivered in one-time, general workshops.
9. Meta-cognitive thinking and constructivist pedagogy produced effective classroom learning.
10. Long-term, big-picture thinking characterized these successful projects." (p. 5)

■ **It is recommended that:**

18. ... the Pro-D introduce more education technology sessions, but in the context of how and where education technology can be a tool to help in the success of Ministry and District priorities.

4.9 Equity, Funding, and Total Cost of Ownership

In general, the technology Funding indicator from the School Technology Stage of Integration, Development, and Implementation assessment for the District was not rated high by District staff. The results were:

INDICATOR	DISTRICT AVERAGE	DISTRICT RANGE
9. Funding	**2.3**	**1.5 — 3.0**

The Funding indicator was rated at a Stage Two (Low) or 2.3 out of 4 Stages of technology development. The range of this rating goes from a Stage 1.5 (Early) to a Stage 3.0 (Medium). See the graph on the next page of all District Schools to see how the rating for Professional Development compared to the other indicators.

The reviewers found that there were inequities between schools and among groups of schools such as Elementary, Middle, and Senior School groupings with respect to education technology funding, hardware, software, and facilities. Also, there appears to be a large number of sources of funding such as:

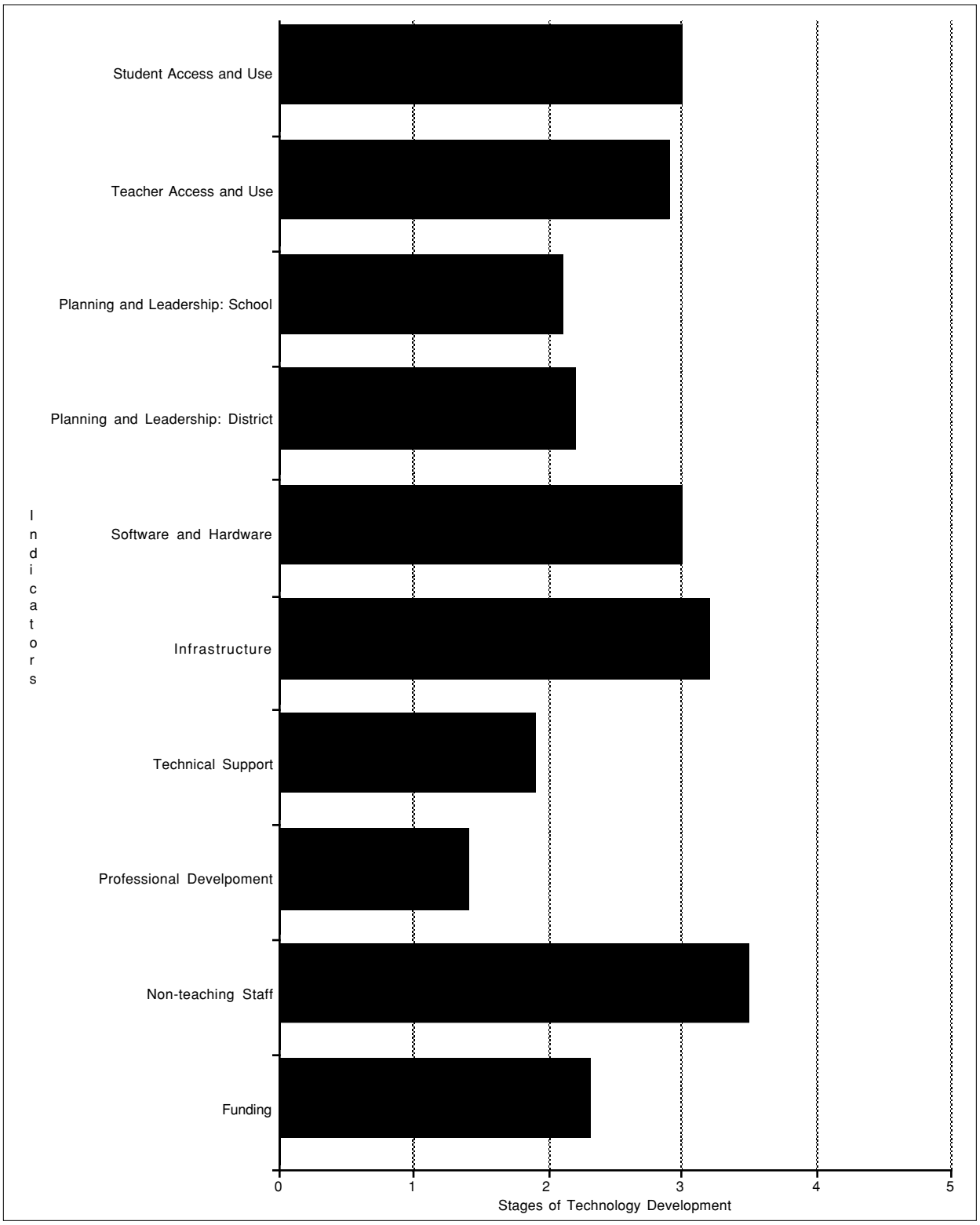
- Many Individual teachers contribute an enormous amount of time, in addition to school hours, in maintaining, developing, and helping to create a working technology environment in their classrooms and schools.

- Many Individual teachers contribute a significant amount of personal money, software, and hardware to bring education technology to their students, classrooms and/or schools,

- An Elementary School PAC recently contributed the following:
    - a new digital camera ;
    - a new media station Computer lab;
    - a classroom Boom Box; and
    - a new classroom listening center.

- Another Elementary School PAC recently contributed the following:
    - an Apple laptop computer;
    - Apple software; and
    - a digital projector.

Profile Graph of the Average Technology Stage of Integration, Development and Implementation for all District Schools



- A Middle School PAC recently contributed the following:
    - Computer repairs and
    - Computer upgrades.
- Numerous fundraising activities including:
    - Collecting Canadian Tire Store Money;
    - Collecting Food Store receipts;
    - Collecting Soup can labels; and
    - Sales.

Throughout the review, the evidence revealed that the implementation and allocation of computer technology generally was described as top down in terms of grade levels. The best technology is currently available at the senior level, next the middle school level and finally the elementary schools. Typically elementary schools have received left over or cast-off legacy technology.

Generally, this appeared to be true in terms of socio-economic areas with the School District. This is obviously not the intent of the District, but typically, elementary schools in higher socio-economic areas had financial support from the local community to improve their access to technology. Elementary Schools in lower socio-economic areas did not receive similar community funding and were thus provided with what was available.

If the goal of the District is to use technology to improve student learning and achievement, then it is logical that the focus of technology funding should shift toward purchasing computer technology and software resources for those students most in need.

There should be District education technology standards for funding, hardware, software, infrastructure, technology support, professional development and training, and management and planning to ensure that all students, teachers, and support staff have the required tools and resources to do their work successfully.

In addition to standards, a tool that can be use to ensure equity and value is the tool of Total Cost of Ownership (TCO). TCO is an analysis of all of the costs of computer technology in a school in comparison to the value that is derived from the current investment. A TCO analysis also includes an assessment of strategies that can be implemented to reduce costs. There are many sources of information on conducting a TCO and different models, templates and spreadsheets, For example, one model identifies six categories of costs:

- hardware;
- resources;
- infrastructure;
- technology support;
- professional development; and
- management and planning.

A step by step process is followed to complete a TCO using the above categories of costs. The steps are:

- Step One — measure all of the costs;
- Step Two — collect data about the value derived from the investment; and
- Step Three — compare the school's decisions and practices to cost-saving strategies of:
    - planning and managing;
    - reducing complexity;
    - increasing reliability; and
    - providing user support.

For additional information go to the following web sites:

- Alberta learning Best Practice Studies at:
  http://www.learning.gov.ab.ca/technology/best practices
- Alberta Learning, "Investigating the Total Cost of Technology in Schools" at:
  http://www.learning.gov.ab.ca/technology/best practices
- California, "Taking Total Cost to the Classroom" at:
  http://www.classroomtco.org/index.html
- Tech Learning: the Resource for Educational Technology Leaders at:
  http://www.techlearning.com/content/outlook/edge/2002/3-8.html
- Consortium for School Networking at:
  http://www.cosn.org/resources/061802.htm
- Consortium for School Network — new initiative with other partners to use data to drive educational decisions at:
  http://www.classroomtco.org
  and at:
  http://www.3d2know.org

It is recommended that:

19. ... the District adopt education technology minimum funding, hardware, software, infrastructure, and facilities standards to promote District equity for all students and staff.

20. ... the District use a Total Cost of Ownership model to maintain equity, compare strategies, compare value for investments, and reduce costs.

Although recently developed, there are a number of funding models that have been developed by Districts to improve funding and insure equity. One model is to financially pull together all funding sources within the District, those from the PAC, school site based funding, District funding, and if available Provincial funding. This potentially large, District based fund, then acts as a source for supporting District technology priorities. The reviewers found that there were multiple sources of technology funding within the District and that decisions as to the parameters of the projects were based upon those who controlled and accessed this funding. For example, funding was available for a small laptop project at a Middle School. These funds may have been better allocated to achieve the broader goals of the District.

Centralizing and taking control of diverse funding sources within the District is politically a difficult task and often takes years to achieve, but the benefits in terms of achieving the technology goals of the District can be significant.

It is recommended that:

21. ... the District, after clearly defined yearly, three year and long term technology goals; and explore and advocate a centralized funding model drawing funds from the diverse budgets across the District.

4.10 Innovation/Pilot Education Technology Projects

There are four innovative/pilot education technology projects identified here for comment:

- the LINUX Labs Project;
- the Mathematics and the Connected Learner Project;
- Teacher Computer Project; and
- the Student Laptop Projects.

LINUX Labs Project

Of all the topics that were discussed during the review period, none came up more frequently than the LINUX labs. The Infrastructure reviewer provided the following analysis.

A couple of years ago, a computer lab was due to be replaced, however, funding was a major problem. After doing some research, it was determined that perhaps a bootable LINUX lab would be appropriate. The software licensing was free, and computers could be obtained from Computers for Schools (CFS). Some minor retrofitting might have to happen to the CFS machines, but they would be essentially super-cheap. The only cost was for the hardware for the server, which had to be fairly robust. The theory behind the LINUX lab is there is no hard drive on the local computer. All the disk access happens on the server, as does most of the processing. The computer is basically a "dumb" terminal. Each machine would therefore function identically. Only one software load would be required, and all the machines would have it. All the software is included, and additional free, or unlicensed-able software is available for installation. It certainly had great potential.

After investigation, and some trial and error, the first lab was setup. Because it was LINUX, you could not run the MS Office package or the Claris works package, rather you'd use the Star Office package. A web browser was available, with all the standard plug-ins. E-Mail was possible, and a variety of other games and programs were installed. Printing and networking was done, and files are stored to the server, so students didn't have to use disks.

The drawback of the LINUX lab setup is that teachers can't use the same Windows or Mac-based CD programs they used before. Further, it's not quite so easy to just purchase some programs and install them. Also, because of the 'thin-client' setup, it's not easy, or sometimes possible to connect a scanner, digital camera, digital video camera, or other media rich devices.

But, does it work? Absolutely. It's reliable. It's inexpensive. Using Star Office, and the other programs loaded, teachers can meet all the objectives required in teaching technology. Is it the same as before? No. Is it better? Perhaps. Is it worse? No. Could it meet the need? Absolutely.

There is no technical reason why this type of lab cannot work in the school situations where it has been deployed. Perhaps there are some other areas that would make sense to use the LINUX terminal server model that are not using it now. For example, in most of the high school labs, where video editing is not being taught, they could easily be replaced with LINUX terminal server labs.

So why all the consternation and confusion?

This reviewer believes that it comes down to planning, and engaging staff in the analysis of putting in new labs, with a new technology. Some people don't like change, and some people would prefer to blame everyone else, and not be part of the solution. It is the theory of the reviewer, that a more open, planned process, allowing input from more stakeholders would've resulted in a much different atmosphere, even with the same technology.

A couple of small changes would've made the labs that much more useful. If a single stand-alone Windows-based computer was also placed in the lab, that could download photos from a digital camera, connect to a scanner, etc., it would alleviate much of the stress. Then the strategic placement of a handful of regular Windows PC's in the same room, or nearby, in the library for example, for those specialized CD programs to be used, would also really help. In reality, a Windows or Macintosh based lab does not normally see every student downloading pictures from a digital camera at the same time, nor scanning, nor running CD's, nor editing video. Students spend the majority of their time with basic productivity software, and web-based applications. Those places where video editing or these other functions are taught to large classes at one time, will require a different type of technology.

Mathematics and the Connected Learner Project

The goals of this Project are to:

- further develop the on-line delivery model for teaching curriculum to rural and remote sites using both asynchronous and synchronous tools; and
- develop e-learning skill sets and support structures for teachers and students.

The District is to be applauded for this leading edge project and in collaboration with:

- School District 71 (Comox Valley);
- School District 84 (Gold River); and
- School District 85 (Vancouver Island North).

This Project will develop three different on-line structures within an integrated environment to teach the Senior Mathematics (Principles of Mathematics and

Essentials of Mathematics) 10, and 11 curriculum through a distance delivery model. The three structures include:

- streaming video;
- live virtual classroom tutorials; and
- database development for on-line student review and practice integrated within the WebCT environment.

Implementation of this Project is underway. The implementation schedule is:

- September 2005 to January 2006, Principles of Mathematics 10;
- February 2006 to June 2006, Principles of mathematics 11;
- September 2006 to January 2007, Essentials of Mathematics 10;
- February 2007 to June 2007, Essentials of mathematics 11.

As the B. C. Ministry of Education may be reviewing this area and initiating new directions. This project should proceed with caution as Ministry initiatives may or may not influence the future of this project.

Teacher Workplace Desktop Computer Project

This innovative Project was approved on December, 2005 by the District Board of School Trustees and the District Teachers' Association. The Project involves the Board providing 350 computers and software for teachers to use in the workplace.

The implementation schedule of this Project is:

- prior to August 31, 2006 175 computers will be installed; and
- prior to June 30, 2007 175 computers will be installed.

It is admirable that the District is providing teacher workplace desktop computer workstation for teachers throughout the District. This is a good step toward supporting computer technology integration throughout the District.

It is important that standard specifications for hardware and a configuration for software be determined before rolling out this project, it is imperative that a standard hardware configuration be developed and approved. In addition, it is also imperative that a standard software configuration also be decided upon and approved. This software configuration would likely be different at the Elementary, Middle and Secondary school levels. It should also be different for itinerant of special needs teachers. Differences in each software configuration should not be significant, but should reflect the different roles and responsibilities of teachers at different levels.

It is also important to insure that teachers understand that computer workstations, are provided to insure every teacher has **access** to a computer workstation, not that every teacher should have a workstation on their desk.

Student Laptop Projects

At the Middle school level, laptop Project planning has been initiated. These are leading edge Projects where preliminary research studies from the U.S. and Canada indicate that expected results may include:

- student achievement scores improve;
- absence rates decline;
- collaborative, project-focused work increases; and
- 21st Century skills (ICT) improve.

Preliminary Implementation of these Projects is underway in two middle schools. One school will equip two classes of students and their teachers with a laptop computer and software on a one to one basis. The other school will equip the school with mobile carts equipped with laptop computers that can be moved throughout the school.

At the time of the visitation in January 2006, the schools were planning purchases, procedures, and policies with an expected startup of September 2006.

The reviewers found that much of the leadership for the student laptop projects was school based and that school staff were unwilling to relinquish control of the project. Although school staff should be applauded for their efforts and leadership, a successful laptop project can only be successful if it is a team effort including the School Board, District and school based administrative staff, teachers, technical staff, parents, and students. A successful laptop project must be supported by a team effort with contributions and suggestions from all stakeholders in the plan.

It is recommended that:

22. ... the District needs to adopt an overall plan and set priorities to evaluate each innovative/pilot project to ensure that the basic or minimum District education technology needs are maintained and that the innovative project contributes education value within this plan, priorities, and District resources.

23. ... the District review the installation of LINUX Labs at the elementary level to ascertain what is required in terms of additional equipment and/or software so that LINUX can serve the needs of elementary school students and teachers.

24. **... the District conduct an analysis of future implications for the Mathematics and Connected Learner project. This Project is very new and little information to determine future implication is available. Also, the B.C. Ministry may begin a new Provincial initiative in this area.**

25. **… the District, develop standard specifications for a desktop computer and for a laptop computer for District teachers and only that configuration be purchased and made available as units for classroom teachers and other District teachers.**

26. **… the District ensure that all teachers within the District including classroom teachers and non-enrolling teachers such as Teacher-Librarians and itinerant teachers have access to a computer workstation.**

27. **… the District determine and mandate a standard software configuration for all teacher workstations. This standard software configuration may vary according to grade level, based on the needs of the specific teacher, but should not vary from school to school.**

28. **… the District mandate and install appropriate software to protect each teacher computer workstation such as DeepFreeze and virus protection.**

29. **… the District explore successful laptop projects in other Districts in British Columbia and in Canada (determine best practices, results, evaluation tools, policy, etc.) and create a District and school based team to implement and evaluate the laptop projects, determine future implications and begin planning for possible expansion of the Project.**

4.11 Robron School/Centre

During the visitation period in January 2006, the Robron School/Centre was in transition as various schools, centres, and services were relocating to the Robron School. At the time of the visitation all of the following had recently relocated and Student Services were moving in soon. Student Services was visited in their offices on the grounds of the Phoenix Middle School.

At the time of the visit, the concept of the Robron School/Centre was evolving and the school was undergoing some technology and other modifications. Some very complex and expensive technology for computer managed learning and special needs were observed. Technology was certainly an integral part of the following areas:

- Adult and Continuing Education Centre;
- eBlend School;
- Student Services;
- the Publications Unit of the First Nations Department; and
- Elm Alternate School.

Adult and Continuing Education Centre

The Adult and Continuing Education Centre provides student access to computers for word processing, the Internet and other course applications at the Centre. In addition the Pathfinder Learning System supports student learning through self-paced programs.

The Pathfinder Learning System has been used for fifteen years and is very old. Upgrades are not available, but the system continues to be useful. The available computer lab is small in space and number of computers available.

Technology planning, funding, and future growth/needs and/or replacement were not evident.

eBlend School

The eBlend School serves students who work from their home. The School supplies students with computers to be used in their home. At the elementary level, parents use the computers to communicate with eBlend teachers. Each family/student(s) communicates biweekly. Middle level and senior level students use the computers as part of learning such as:

- word processing;
- powerpoint;
- Internet research; and
- accessing curriculum materials.

Technology planning, funding, and future growth/needs and/or replacement were not evident.

Student Services

The Student Services Centre has used a variety of simple and very complex technologies to support student learning where individual students have special needs. The Centre recognized the potential of technology to address student special needs many years ago. For example, the Centre adopted laptop computers for all teaching staff a number of years ago and teachers have obtained the necessary skills to utilize this technology in areas such as:

- e-mail;
- record keeping;
- powerpoint;
- specialized special needs software; and
- IEP software.

In addition. depending on the responsibilities and assignments of individual teachers, there con be a large list of other low technologies and very complex technologies used by an individual teacher, such as:

- Boardmaker;
- software for high technology communication devices;
- Discover Switch software;
- Kurzweill equipped student laptop computer packages;
- Co-writer and other word prediction software; and
- scanner software to create adapted talking books.

In addition, many computer peripheral devices are used by individual teachers, such as:

- scanners;
- printers;
- digital cameras;
- external hard drives; and
- digital video cameras.

Technology planning, funding, and future growth/needs and/or replacement were not evident.

Publications Unit of First Nations Education Department

The First Nations Education Department has all language teachers with access to computers at work and home. These are used for:

- e-mail;
- Internet research; and
- curriculum planning and development.

The First Nations Publications Centre at the Robron School/Centre was very impressive, using computer publishing technology for the development of First

Nations student and teacher curriculum materials that are not available. These materials are of high quality and relevance because of the languages and heritage content. Interest in these materials from other school districts has resulted in external sales.

Other means to increase First Nations language and heritage resources are being explored with such technologies as:

- laptop computers;
- digital projectors; and
- a First Nations web site.

Technology planning, funding, and future growth/needs and/or replacement were not evident.

Elm Alternate School

The Elm Alternate School emphasizes human interaction with students. Students seldom use computers except for word processing or the occasional course assigned research on the Internet. The teachers have access to computers for areas such as student records and completion of IEPs .

Technology planning, funding, and future growth/needs and/or replacement were not evident.

■ **It is recommended that:**

30. ... the District develop an overall strategy for specialized and expensive software and hardware for very complex and sophisticated uses such as: special needs, computer managed learning, distance learning, etc. as they relate to the Robron School/Centre and future expansion/migration of this technology into regular schools.

31. ... the District in cooperation with each Robron School/Centre/Unit develop three year technology plans. In addition, these plans should include, where appropriate, cooperative areas for shared use of complex and expensive technologies.

4.12 Education Resource Centre and Library Services

The Education Resource Centre and Library Services program is one of the many highlights of the District. A walkthrough and discussion with some staff indicated that Campbell River has one of best District Resource Centres in the Province, providing excellent services to schools and staff.

The School Library collection in all schools is automated and provides all of the standard library automation features including circulation, OPAC, cataloguing, authority control, inventory, and reporting. Students and staff have access to a web based program for searching the library collection in the school and at home.

The District, through the Education Resource Centre and as a member of the B. C. Educational Resources Acquisition Consortium of and the Consortium has purchased a three year license to both Thompson Gale (Infotrac) and the Encyclopedia of BC. As a member of the Consortium, the District can obtain considerable savings on provincially negotiated prices for texts, videos, etc. The Alberta Education (Department of Education) Learning Resources Branch is one of these sources through an agreement between British Columbia and Alberta.

Although, the use of online subscription services for student research such as EBSCOHost, Thompson Gale, Encyclopedia of BC and others is becoming quite common in B. C. Districts to expand controlled student access to a wide range of research materials including periodicals, newspapers, magazines and other print resources through the Internet, there is no evidence that any of the District school libraries in the District are purchasing online subscriptions. There was some indication that a few Teacher-Librarians were exploring the purchase of Encyclopedia Britannica as a service in some school libraries.

Campbell River School District as a member of the Educational Resources Acquisition Consortium of BC and the Consortium has purchased a three year license to both Thompson Gale (Infotrac) and the Encyclopedia of BC. Although these services are available free to all District schools, there was no evidence that any schools are taking advantage of these services. The reviewer was puzzled by the lack of use and implementation of a service that is essentially free to all District schools.

Currently the Resource Centre is using an online catalogue that was locally developed and has severe limitations. Consideration should be given to replacing this catalogue with a suitable cataloguing and media booking system that provides not only an online catalogue, but also a means for teachers to order and book learning resources.

There was some discussion about the viability of the current video collection which is composed of a large collection of videotapes in the VHS format. Currently the Education Resource Centre is not considering a change to newer

technologies such as DVD or video streaming. In many ways this is a valid conclusion, as there are serious concerns about the long term durability of the DVD format and video streaming is quite costly to implement.
Library cataloguing is centralized in the District Education Centre and Library Service Department. The District employs a District Teacher-Librarian, although the person was away on a leave-of-absence during the Technology Review visitations in January 2006. Two library clerks work on a part-time basis each week to process and catalogue all new acquisitions. There are distinct advantages to this system as it insures clear standard cataloguing standards and reduces duplication at all School Libraries. This is one component of the library automation program that is working very well.

It is recommended that:

32. … the District and the Education Resource Centre support the purchase and implementation of a flexible media and equipment cataloguing and scheduling program.

33. … the District and the Education Resource Centre re-evaluate the decision to stay with VHS as the primary video delivery method and explore both DVD as an acquisition and/or the implementation of a site based video streaming option.

34. … the District and the Education Resource Centre implement as soon as possible the use of the online reference resources currently available to the District through the Educational Resources Acquisition Consortium of BC (Specifically Thompson Gale and Encyclopedia of BC).

4.13 School Libraries

School libraries and Teacher-Librarians are available in all schools. The FTE time allocated for each school varies with Senior and Middle School Teacher-Librarians typically allocated as .5 FTE and the Elementary School are allocated from .4 to .2 Teacher-Librarian time. Library Clerks are also available to support the Teacher-Librarian and the school, but are often assigned at a different time then when the Teacher-Librarian is assigned, primarily to insure more complete coverage the school libraries. The District also employs a District Teacher-Librarian, although she was away on a leave-of-absence during the Technology Review.

This is a major achievement and commitment to excellence at a time when school library support is in crisis across Canada. In any future technology development and planning the Library should be part, a major component of a broad based District Technology Plan.

With respect to school libraries, a recent Canadian study, "The Crisis in Canada's School Libraries: The Case for Reform and Reinvestment" by Dr. Ken Haycock, has gathered evidence to indicate that children and adolescents show higher achievement, improved literacy, impact on cultural identity, and greater success at the post-secondary level when they attend schools with well-funded, properly stocked libraries managed by qualified teacher-librarians.

The 52-page report is the first comprehensive Canadian study examining the educational impact of school libraries and teacher-librarians in the context of the steady decline in support for these institutions across the country.

It concludes with 13 recommendations on how provincial education ministries can begin to reform school library policy.

> "The evidence is there for all to see," says Dr. Haycock. "That's why governments in the U.S., Europe and Asia are aggressively investing in their school libraries. What's disturbing is that Canadian policy makers are ignoring the findings of literally decades of research that shows why school libraries and qualified teacher-librarians are essential components in the academic programming of any school."

Citing the conclusions of hundreds of studies conducted in countries around the world, Dr. Haycock's report shows that:

- larger library collections for students, including books, periodical subscriptions and electronic subscriptions, means higher achievement;
- increased spending on library books and other materials correlates with improved reading scores;
- test scores rise when students have greater access to Teacher-Librarians;

- school library programs have been shown to improve boys' reading skills;
- school library programs and staffing levels are linked to student success in post-secondary education; and
- high-achieving schools tend to assign a greater priority to school library funding from the other program choices available to them.

As well, the report summarizes the results of a series of landmark studies conducted in 3,300 schools across the U.S. since 1992, which have consistently shown the positive affect of school library programs on standardized test scores and reading achievement. These studies are refereed to as the Colorado School Library Studies.

For additional information:

- "The Crisis Canada's School Libraries: The Case for Reform and Investment" by Dr. Ken Kaycock, June 2003. This study was funded by the Association of Canadian Publishers and the Canada Government, Department of Canadian Heritage at: http://www.cla.ca/slip/research.htm
- School Library Information Portal, the Canadian connection to School Library documents at: http://www.cla.ca/slip/research.htm
- Colorado Library Research Services and School Library Effectiveness Studies at: http://www.lrs.org and http://www.lrs.org/School_stats.htm

Generally Teacher-Librarians support the use of technology in the school libraries, although there was some evidence that there are frustrations with hardware and software that is not reliable and does not work. Teacher-Librarians sometimes did not see the value of technology because of their frustrations. In addition, some Teacher-Librarians provided services to as many as three different school and found themselves quite stretched out just to provide basic services. It was also quite common to find Teacher-Librarians and Library Clerks working different hours or different days which reduced the ability for a consistent program within the school.

The library collection in all schools is automated and provides all of the standard library automation features including circulation, OPAC, cataloguing, authority control, inventory, and reporting. Students and staff have access to a web based client for searching the library collection in the school and at home. A number of years ago the District acquired the Gateway system from Meriwether which provides a centralized union catalogue model that runs on the District AS400 server. All schools connect to the central District server. Teacher-Librarians and Library Clerks have access to the management system on designated administration systems in most schools and there are a number of workstations allocated in each school to the Online Public Access Catalogue (OPAC). In most

cases the library administrative systems are more current technology, although it was observed that in some cases Teacher-Librarians and Library Clerks struggled with the reliability of their Administration workstations.

Library cataloguing is centralized in the District Education Centre & Library Services Department. Two library clerks work on a part-time basis each week to process and catalogue all new acquisitions. There are distinct advantages to this system as it insures clear standard cataloguing standards and reduces duplication at all schools. This is one component of the library automation program that was observed to work very well.

As noted above, staff and students have access to the library collection through the OPAC and can search for books at school or at home via the Internet. In a number of cases, the technology used for OPAC workstations in the schools was quite old and unreliable. This significantly reduced the effectiveness of the OPAC workstations. This was true whether at the Secondary level or at the Elementary level. There was clear evidence that library staff, teachers and student were frustrated with the use of the Gateway Library Automation system, but that much of the frustration was the result of aged technology used both to manage the system and as OPAC workstations.

Some school libraries had developed web pages although these were typically developed using web development software or other software and uploaded as part of the school web page. This is often very time-consuming and makes it very difficult for a school Teacher-Librarian, with their limited FTE allocation to keep a school library web page current. The District should consider a more effective and efficient web content management system to insure it is easy for Teacher-Librarians to provide a current school library web page.

Although, the use of online subscription services for student research such as EBSCOHost, Thompson Gale, Encyclopedia of BC and others is becoming quite common, in B. C. School Districts, to expand controlled student access to a wide range of research materials including periodicals, newspapers, magazines and other print resources through the Internet, there is no evidence that any of the school libraries in the District are purchasing online subscriptions. There was some indication that a few Teacher-Librarians were exploring the purchase of Encyclopedia Britannica as a service in some school libraries. Campbell River School District as a member of the Educational Resources Acquisition Consortium of BC and the Consortium has purchased a three year license to both Thompson

Gale (Infotrac) and the Encyclopedia of BC. Although these services are available free to all B. C. School District schools, there was no evidence that any District schools are taking advantage of these services. The reviewer was puzzled by the lack of use and implementation of a service that is essentially free to all District schools.

Answers to the following selected questions from The District Teachers Survey and Questionnaire provide additional insights to the above views:

- **Question # 7. My computer and IT access is appropriate for instructional use in the library.**

  - Yes 40 %
  - No 45 %
  - Don't Know 15 %
  - Not Applicable 0 %

  NOTE: Only 40 % of teachers indicated that their computer and IT access is appropriate for instructional use in the library; while 45 % do not and 15% do not know.

- **Question #12. Minutes per week a typical student would use the Internet in your classroom for curricular purposes.**

  - 0 minutes 58 %
  - 15 minutes 11 %
  - 30 minutes 6 %
  - 60 minutes 7 %
  - 120 minutes 1 %
  - 120+ minutes 1 %
  - Not Applicable 16 %

  NOTE: Almost 60% of Teachers indicated there was no student use of the Internet in their classroom for curriculum purposes.

- **Question #13. Minutes per week a typical student would use the Internet in a computer lab and/or library for curricular purposes.**

  - 0 minutes 35 %
  - 15 minutes 16 %
  - 30 minutes 17 %
  - 60 minutes 8 %
  - 120 minutes 3 %
  - 120+ minutes 2 %
  - Not Applicable 19 %

  NOTE: About 35% of Teachers indicated there was no student use of the Internet in a computer lab and/or library for curriculum purposes, but 46% of Teachers indicated that 15 to over 120 minutes of student time was used in a computer lab and/or library .

- **Question # 25. Effective use of computers and information technologies by students in the library is...**

  - Very Low 21 %
  - Low 14 %
  - Neither low nor high 22 %
  - High 9 %
  - Very High 1 %
  - Don't Know 33 %

  NOTE: Only 10 % of Teachers indicated use of computers and information technologies by students in the library as high or very high; while 35 % did this on a low or very low basis and 33 % do not know.

Similarly, answers to the following selected questions from The District Principals and Vice-Principals Survey and Questionnaire provide additional insights to the above views:

- **Question # 21. Effective use of computers and information technologies by students in the library is...**

  - Very Low 11 %
  - Low 21 %
  - Neither low nor high 18 %
  - High 36 %
  - Very High 7 %
  - Don't Know 7 %

  NOTE: About 43 % of Principals and Vice-Principals indicated effective use of computers and information technologies by students in the library as high or very high; while 32 % did this on a low or very low basis and 7 % do not know.

  NOTE: Comparing the differences and similarities between the last Teachers Survey question (#25) and the last Principals and Vice-Principals Survey question (#21) can be very useful. For example, there are large response differences on:

  - "high or very high" responses,
    Teachers 10 % to Principals and Vice-Principals 43 %;

  and

  - "do not know" responses,
    Teachers 33 % to Principals and Vice-Principals 7 %.

It is recommended that:

35. **… the District review the role of Teacher-Librarians and the role of Library Clerks and provide training so that Teacher-Librarians and Library Clerks have the opportunity to become leaders in the use of all media including information and communication technology for an expanded and more comprehensive definition of literacy.**

36. **… the District , in the school libraries, focus on the improvement of computer workstations available to library staff for Gateway administration and on computer workstations available for students to search both the Gateway online library program but also for general online based research. This should be a priority for computer hardware upgrades at each school.**

37. **… the District, as a first step toward using computer technology to support student learning and achievement, strongly support the use of computers and information technology by students in the library.**

4.14 Software, Hardware, and Network Infrastructure

In general, the technology Software and Hardware indicator and the Infrastructure indicator from the School Technology Stage of Integration, Development, and Implementation assessment for the District were both rated very high by District staff. The results were:

INDICATOR	DISTRICT AVERAGE	DISTRICT RANGE
4. Software and Hardware	**3.0**	**2.2 — 3.7**
5. Infrastructure	**3.2**	**3.0 — 3.5**

The Software and Hardware indicator was rated at a Stage Three (Medium) or 3.0 out of 4 Stages of technology development. The range of this rating goes from a Stage 2.2 (Low) to a Stage 3.7 (Medium/High). See the graph on the next page of all District Schools to see how the rating for Software and Hardware compared to the other indicators.

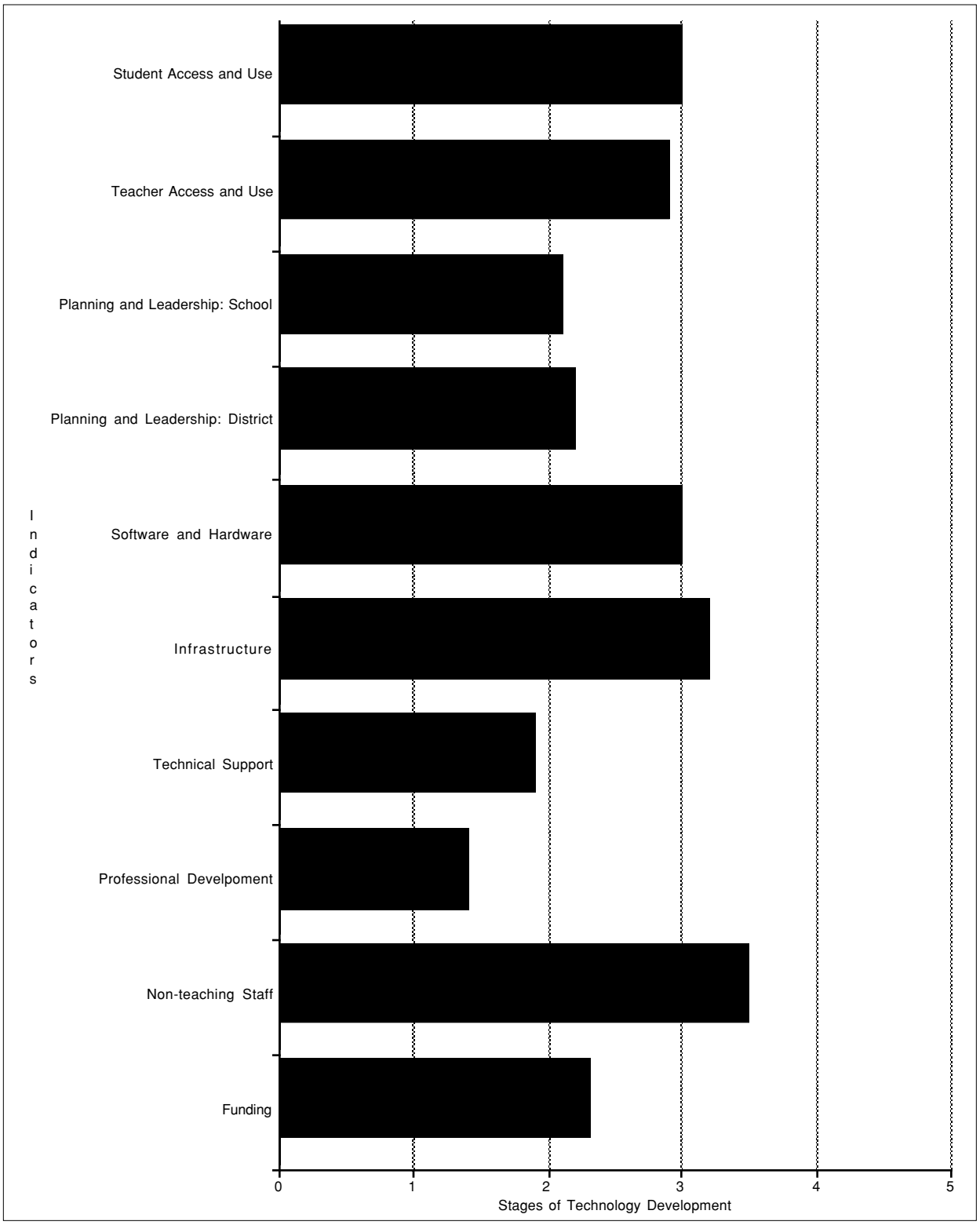
The Infrastructure indicator was rated at a Stage Three (Medium) or 3.2 out of 4 Stages of technology development. The range of this rating goes from a Stage 3.0 (Medium) to a Stage 3.5 (Medium/High). See the graph on the next page of all District Schools to see how the rating for Software and Hardware compared to the other indicators.

The Infrastructure Reviewer indicated that the District has some remarkable infrastructure to support the technology within it's schools. The Tech Department consists of very dedicated, knowledgeable, and personable staff who seem to have a real desire to provide the best service possible to District staff and students. Campbell River Schools has teamed with PLNet to provide network infrastructure, as well as Campbell River Community Network (CRCN) and Campbell River TV (CRTV). These partnerships have been invaluable to the support of the schools. Historically the schools have had mixed platforms, some Windows-based, some Macintosh-based, and all are utilized by staff and students everywhere.

The following recommendation in a number of areas have been made to further improve the software, hardware, and infrastructure.

NOTE; All software, hardware, and infrastructure recommendations are listed in Attachments 2 and 3 by cost and priority.

Profile Graph of the Average Technology Stage of Integration, Development and Implementation for all District Schools



District Network

The network is a key resource for the utilization of technology. A properly designed network allows for expansion, ease of management, and ensures that traffic originating in one node, will arrive at it's destination, in a reasonable period of time. The network can be very simple, and can be very complex, and can be setup in multiple incarnations. One of the strengths of the Campbell River Schools network is it's network. The network is extremely stable, and very well-designed. The wiring is clean, well-documented, and allows for easy trouble shooting. PLNet takes care of the Wide Area Network connections on behalf of the schools, and works in tandem with the tech support department. The network could be considered the heart of the technology infrastructure, and this is a pretty standard heart. However it's current life expectancy is fairly low, and without some attention, it will not fulfill very many future needs.

It is recommended for Network Gear that:

38. **... the District select a hardware vendor as their data networking standard, and keep that vendor for a significant period of time. At least for 3 years.**
39. **... the District install at least one QoS capable data switch in each site at the very minimum, but preferably in each wiring closet. This vendor should match the data gear selected for the non-QoS areas.**

It is recommended for a Firewall that:

40. **... the District should immediately investigate the installation of a firewall or system of firewalls in order to protect the resources within their schools.**

It is recommended for a Addressing that:

41. **... the District, working with PLNet, move to a privately addressed network.**

It is recommended for Dynamic Host Configuration Protocol that:

42. **... each School should have it's own local DHCP server providing addresses to their local site.**

It is recommended for Proxy Servers that:

43. ... the District should evaluate their decision to remove caching proxy servers from the local schools, and consider implementing them again. With the goal of more effectively managing both their traffic, and their bandwidth.

It is recommended for an Anti-virus Strategy that:

44. ... the District should take a good look at their antivirus solution. Should they choose to maintain the Symantec Antivirus setup, then the server must be monitored on a daily basis to ensure updates are occurring. Further, monitoring the server will also indicate whether or not the workstations are also receiving updates, and are ready for the threat of new viruses as they are released.

It is recommended for External Staff Access that:

45. ... the District appoint a small committee to research and investigate the feasibility of providing standardized access to school resources to staff members at home. This investigation should include research into the costs associated, both soft, and hard, with providing this service to staff, and also incorporate how security could be handled.

Servers

Servers are made available to provide some sort of service to users on the local or wide area network. Campbell River Schools incorporates servers for a number of key activities including file repositories, student information repositories, financial services, among many others.

An excellent job of keeping the number of required servers to a minimum has been done. It is possible to go overboard in setting up a variety of servers for a large variety of duties. However with the limited resources available to the Tech Department, a fantastic job of providing better than essential service has been done.

In Campbell River Schools, elementary schools do not tend to have a Novell file server, as there are very few teacher and administrative computers within the buildings. A central file server has been setup where schools can store their data. These elementary schools often have a Mac OS X server for storing files students create on the computers, and also for managing access and use of the computers.

Middle schools and High schools each have their own Novell server for storing staff and administrative files. Additionally, they may also have a Mac OS X based server for the same purpose as used by elementary schools.

Each of the servers that was observed by the reviewer were in good shape, working well, and most were connected to a power conditioning device, which will help them in case of brown-outs, surges, and total power failure.

The tech support department should be commended for the state of the servers as observed.

- **It is recommended for File and Print that:**

    46. ... the District should continue the practice of installing redundant hard drives in their servers, and seriously consider making redundant drives a part of the existing server fleet.

- **It is recommended for Mac Servers and Windows Servers that:**

    47. ... the District should incorporate a single file server access across platforms. Using either the Novell server or the Mac OS X as the file server for all platforms.

- **It is recommended for E-mail that:**

    48. ... the District should consider housing their own internal mail server. It will certainly add to the cost and the load of the tech support staff, but the measurable benefits should outweigh the costs.

Disaster Recovery

Backups are a constant source of concern for the reviewer. The purpose of a backup is to provide data recovery in the case of a catastrophic event. A catastrophic event is not a user losing an individual file, or a group of files, or even a day of work. A catastrophic event is the loss of a server hard drive, the burning down of a building, a server being stolen, etc.

At the time of the review, backups of some essential servers were being done in the central office. Additionally, the Novell servers all had RAID1, or mirrored hard drives, so that all of the data is stored in two places. However actual backups of the data to an offsite facility was not being done. Thus if a server was stolen, or a building burned down, the data would be irretrievably lost. In

discussion the situation with the Tech Department, it was discovered that a plan for backing up the school servers to other schools was already in the works. A couple of solutions had presented themselves, including centralized backups, and round-robin backups where school A would be backed up to school B, and B to C, and C to D, and so on. Both of these solutions are a simple, easy solution, to a complex problem.

It is recommended for Backup of Data that:

49. ... the District tech support department should implement either a centralized, or round-robin backup plan for school servers as they had explained to the reviewer.

Technical Support — Decisions

The area of technical support encompasses a number of systems and processes. The Tech Department of Campbell River Schools is doing some extraordinary work, given the resources at hand. Rarely has this reviewer met a group of individuals who are able to come together as a team, for the benefit of their schools. Each member of the team has a heart to do an incredible job, and find whatever ways possible to bring improvements to the system for District staff and students. However they are in many ways hampered by the processes and procedures that they are required to work with. Some small changes, and some major changes will be necessary to realize the full potential of the Tech Department of Campbell River Schools.

It is recommended for Software Acquisition that:

50. ... the District Software Acquisition should be moved into the technology department for purchasing, administration, and tracking. A centralized database should be created which references the work order and asset tracking systems to better organize software licenses.

It is recommended for Hardware Acquisition that:

51. ... the District Hardware Acquisition be done through the Tech Department directly, with input, analysis, and research shared amongst stakeholders. The department should standardize on a particular vendor, or at least a particular hardware that can be identically supplied through multiple sources.

- **It is recommended for the LINUX Labs Pilot that:**

    52. **... the District should be applauded for their attempt to try the LINUX terminal server lab environment. This project should not be scrapped, rather enhanced with some additional tools to make the lives of teachers easier. Further, more research and testing should be completed to determine where these labs are best utilized, and where their benefits and potential are greater. Care should be taken to ensure the needs of the school are met.**

- **It is recommended for Digital/Network Photocopiers that:**

    53. **... the District should look at photocopier replacement with a fully digital fleet, across the system, in order to realize tremendous cost savings, and removing costly network laser printers.**

    54. **... the Tech Department should be involved in all aspects of technology acquisition, especially as it connects to the network.**

- **It is recommended for Operating Systems that:**

    55. **... the District should undertake some manner of internal review, working with a group of it's stakeholders, to examine the platforms that are supported and the reasoning behind this support.**

Technology Management Committee

Historically, there have been a number of methods whereby technology governance could occur. A number of years prior, there was a District Technology Advisory Committee. This group was made up of a wide cross-section of different people, including administrators, teachers, Sr. Admin. staff, parents, and technicians. This group, over time, became a sounding board and decision-making board. However, the funding for this group disappeared, and as a result, it was disbanded.

Following on it's heels, was the Technology Management Committee. This smaller group is essentially made up of Sr. Admin. staff, some administrators, the Manager of Operations, who meet sometimes as often as every three weeks to consider

and make decisions with respect to new implementations of technology. This is the group which determines where moneys will be allocated and which projects will happen. They have an approximate annual budget of $100,000. Part of their role is to manage the technology plan.

However, there doesn't appear to be any representation of the Tech Department, and as a result, there appears to be a perception that sometimes this group makes decisions that perhaps are not technologically advisable. Further, another commonly heard perception, was that meetings were frequently canceled or postponed, and as a result, some items do not get the attention they need, within a reasonable timeframe.

These perceptions may not be reality, but for many staff, perception becomes their reality.

It is recommended for Operating Systems that:

56. ... the District Technology Management Committee should ensure that their work is transparent, consistent, and has some representation from the Tech Department. This will help ensure that people's perceptions become more accurate, and as a result, the strength of this committee may become more evident.

Future Planning /Proofing/Evergreening

Future planning and proofing are critical areas to ensure that the infrastructure that schools rely on will be there when it is needed. The data gear infrastructure, as detailed elsewhere, is sound, and strong. Most of the servers that have been setup have some fault-tolerancy built-in, and would be considered stable, and sound.

However, it is incumbent on Campbell River Schools to ensure that the technology needs of it's "clients" are considered in future planning. Some schools currently receive technology only upon major physical plant renovations, and this is not done frequently enough for the technology to remain viable. This reviewer was given a number of sample documents and proposals, outlining suggested annual budgets, and cost analysis to ensure that future proofing and evergreening do occur. However, it would appear that funding was not made available for these proposals. As a result, much of the technology has become quite aged, and troublesome.

One suggestion would be to determine some minimum technology levels, age, and standards, and incorporate it into the annual budget of the school system.

If funding is based on per student, then a per student amount could be taken off the top each year to fund this project. For example, a standard number of labs in each school, perhaps related to the size of the school, computers in offices, teachers desks, etc., could be determined. All of the computers could have a life expectancy of five years, and a budget and roll-out plan built based on these numbers.

Another method would be to make suggested minimum standards, and encourage schools to budget or build-up reserves for these potential capital purchases.

The advantage of doing this planning and acquisition as a school system project would make budgeting easier, would take computer acquisition off the budget of each principal, and allow for some bulk purchasing which would result in lower acquisition costs.

It is recommended for Future planning/Proofing/Evergreening that:

57. ... the District create a centrally managed Technology Evergreen plan incorporating all computers in classrooms, labs, and offices, all printers, and various other technologies. This plan could be funded on a per student basis out of the annual education grant moneys.

4.15 Technical Support Services

In general, the technology Technical Support indicator from the School Technology Stage of Integration, Development, and Implementation assessment for the District was not rated very high by District staff. The results were:

INDICATOR	DISTRICT AVERAGE	DISTRICT RANGE
6. Technical Support	**1.9**	**1.7 — 2.0**

The Technical support indicator was rated at about a Stage Two (Low) or 1.9 out of 4 Stages of technology development. The range of this rating goes from a Stage 1.7 (Early/Low) to a Stage 2 (Low). See the graph on the next page of all District Schools to see how the rating for Technical Support compared to the other indicators.

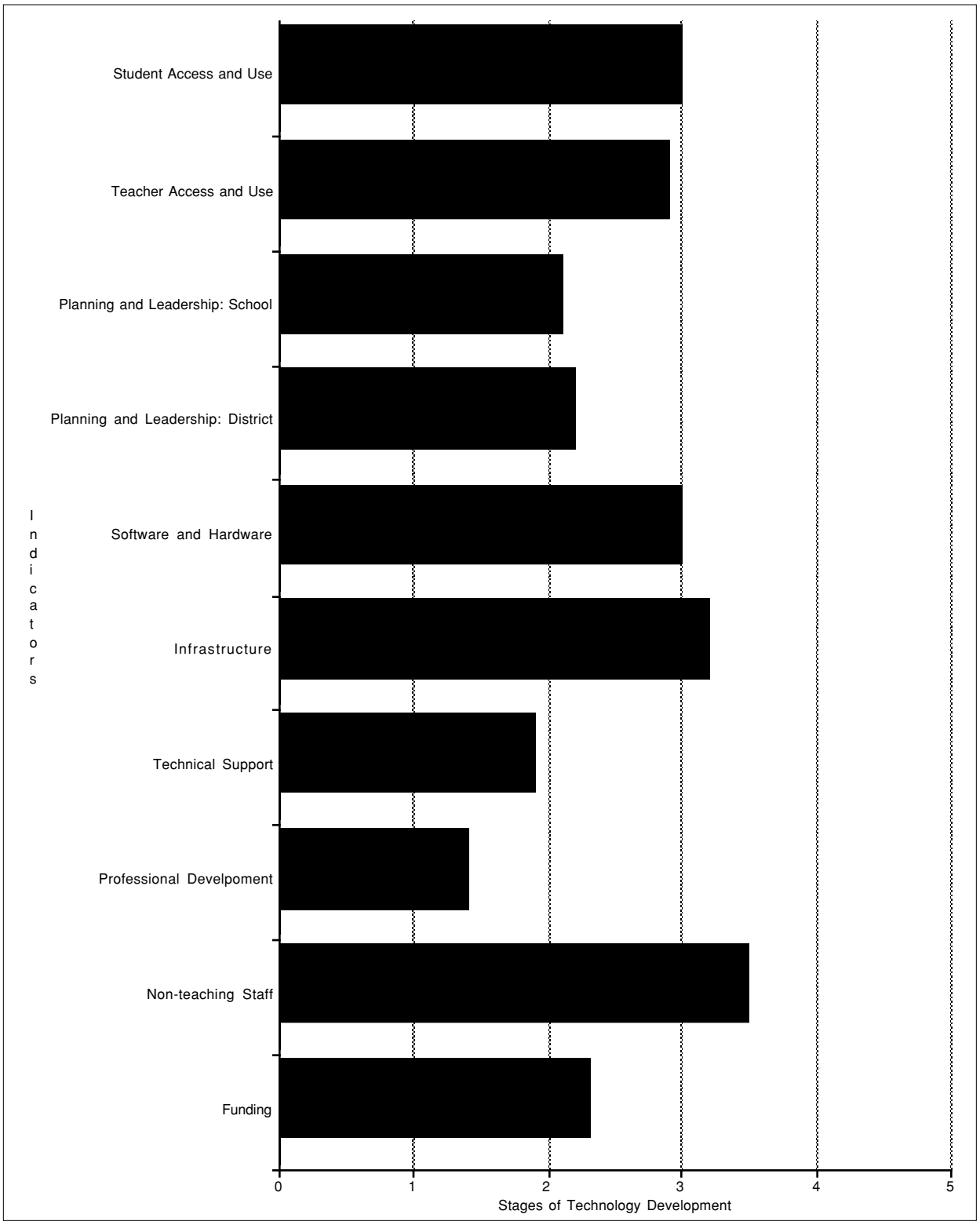
In contrast to these findings above, the Infrastructure Reviewer found the area of technical support encompasses a number of systems and processes. The Tech Department of Campbell River Schools is doing some extraordinary work, given the resources at hand. Rarely has this reviewer met a group of individuals who are able to come together as a team, for the benefit of their schools. Each member of the team has a heart to do an incredible job, and find whatever ways possible to bring improvements to the system for District staff and students. However they are in many ways hampered by the processes and procedures that they are required to work with. Some small changes, and some major changes will be necessary to realize the full potential of the Tech Department of Campbell River Schools. A number of recommendations to improve services follow.

NOTE; All software, hardware, and infrastructure recommendations are listed in Attachments 2 and 3 by cost and priority.

■ **It is recommended for Tech Work Orders that:**

58. ... the District should investigate a replacement work order system for the one that is currently in use for the Tech Department. This could be an off-the-shelf product, or an internally generated product. If staff internally could build it, it would be more likely to meet their needs, and just might be less costly in the long run.

Profile Graph of the Average Technology Stage of Integration, Development and Implementation for all District Schools



Answers to the following selected questions from The District Teachers Survey and Questionnaire provide additional insights to the above views and those on Technical Support to schools.:

- **Question # 14. There is appropriate school-level technical support to keep the computers and IT running.**
  - Yes 53 %
  - No 38 %
  - Don't Know 9 %

  NOTE: About 53 % of teachers indicated that there is appropriate school-level technical support to keep the computers and IT running; while 38 % do not and 9 % do not know.

- **Question # 15. There is appropriate district-level technical support to keep the computers and IT running.**
  - Yes 32 %
  - No 44 %
  - Don't Know 24 %

  NOTE: Only 32 % of teachers indicated there is appropriate district-level technical support to keep the computers and IT running; while 44 % do not and 24 % do not know.

It is recommended for Technical Support to Schools that:

59. ... the District expand the scheduled visits system such that technicians actually spend more time in the schools on scheduled visits, than on work order, or emergency visits.

60. ... Help Desk personnel should consist of the regular technicians who can provide expert support to school staff.

It is recommended for Technology Inventory that:

61. ... the District should investigate the development of a new web-based inventory system that links directly with the work order system to allow for more efficient use of time, and better record keeping.

62. ... some clerical support time should be added to the technical support department, so that minor areas of paperwork can be completed in a reasonable timeframe.

It is recommended for Tech Department Communications that:

63. ... some FTE of clerical support be added to the technical support department to be a central point of incoming phone calls and messages.

64. ... pagers could be replaced with cell phones, ensuring quicker response time, and a better use of time.

65. ... technicians be allocated items based on the school, or based on a skills list that could be maintained by the clerical staff.

As mentioned earlier in this document, the Infrastructure Reviewer was very impressed with the frankness, friendliness, and willingness of the members of this department to improve upon their service to staff and schools. Rarely has another tech support department been observed to be as conscientious and concerned about doing a great job, regardless of the hours needed to complete. Like many departments, they are sometimes afraid of change, as they are used to doing things in a certain way. However, they were willing to try new things regardless of their personal feelings.

Currently the Tech Department is made up of four permanent staff, and one temporary person. There is a Lead Technician, and four other technicians. These five people take care of the network, all of the servers, all of the hardware, and software throughout all of Campbell River Schools. In the opinion of the reviewer, they are doing an excellent job given the constraints that they work within. These constraints include some of the geographical challenges of the various schools, the budget allocated, the work order and inventory systems available to them, and the number of parties involved in many of the projects undertaken.

As noted elsewhere, there are recommendations that the Tech Department take on even more roles, especially with some network changes, and additional services to provide. Further, the reviewer would suggest that the Tech Department be involved in many other areas, such as in VoIP planning, photocopier roll-out, representation at the Sr. Admin. level, representation with the school tech contacts to name a few. Further, software licensing needs to be solidified, some of the infrastructure will need attention, and various clerical needs are not being fulfilled. To be blunt, there are some areas, especially in the clerical area, that a technician is too expensive to be doing.

However, these changes and extras are not feasible given the structure and the number of staff that currently make up the Tech Department. This reviewer would recommend some changes.

First, some clerical staff needs to be assigned to the Tech Department. In observing how things are done, a good starting point would be approximately 0.2 FTE of clerical help to take care of filing, communications, inventory, and documentation. This position could potentially grow somewhat, perhaps even to as much as 0.5 FTE. It is conceivable that this person could also be the front-line help desk person, thus 0.5 as help desk, and 0.5 as clerical.

Second, incorporating the recommendations contained within the Infrastructure Review Report will require further technical support. The scheduling of technicians to schools should make a large positive impact to the schools. But beyond that, there are a number of key networking recommendations made. This reviewer would propose that a 1.0 technician who was strictly responsible for the networking gear (switches, routers), Internet connections, firewalls, VPN, DHCP services, and VoIP support be added to the team. This person would primarily deal with network issues, but may also manage and monitor various servers and services. They would not be part of the regular school maintenance schedule, and would rarely be involved in hardware level repairs to various workstations. However, they would function as a part of the team, and when the team tackles a project, this person would be a part of that.

Third, the Tech Department is at this point functioning, however one of their members is only available temporarily. This reviewer would recommend that this position be made permanent, and thus the staffing of the Tech Department, with respect to technicians, should be adequate. The reviewer has observed much larger Tech Departments in smaller school jurisdictions, however those jurisdictions also had a much larger base of technology. Should Campbell River Schools make any major changes to their technology base, for example, ensuring that every teacher has a computer on their desk, then the Tech Department would need another permanent 1.0 FTE accorded to it.

Finally, this reviewer would suggest another new position is required. That being a Director of Technology, or Manager of Technology, depending on the terminology used within Campbell River Schools. This person should work directly at the Sr. Admin. level, perhaps for the Superintendent, perhaps for the Secretary Treasurer, and would work alongside the Manager of Operations. This Director would be responsible for all areas of technology, including computers, photocopiers, networks, telephones, and all software and database systems.

This person would need some very strong technical skills, but also incredible people, and planning skills. They would represent the Tech Department at all levels, and would have responsibility to work directly with Principals and Sr. Administration on all projects that have any linkages with technology of any kind. Security systems and wiring would be the responsibility of this leader, but they may work within another department, like infrastructure.

The reviewer feels that the lack of this position, is singularly one of the greatest reasons that technology has not flourished as much as it could within Campbell River Schools, and of all the recommendations made herein, this would be the most important one.

■ **It is recommended that the District:**

66. ... hire at least 0.2 FTE clerical, and potentially 1.0 including Help Desk Functions.

67. ... hire 1.0 additional technician just to take care of the network, and network-related infrastructure.

68. ... convert the existing "temporary" technician into a permanent position.

69. ... hire 1.0 additional technician if the fleet of computers should increase in a major way, the example being perhaps in placing a computer on each staff members desk.

70. ... hire 1.0 Director of Technology to oversee all aspects of technology and technology-related items.

4.16 Administrative Uses of Computers

The technology Role of Non-Teaching Staff indicator from the School Technology Stage of Integration, Development, and Implementation assessment for the District was rated very high by District school staff.

The overall average for all schools is 3.5, that is between Stage three (MEDIUM) and Stage Four (HIGH). In general terms, the District Role of Non-Teaching Staff rating by School staff exceed **Stage Three (MEDIUM)** where this stage is defined as:

- secretary(s) uses advanced features of student records and reporting software, word processing software and implements computer accounting.
- other non-teaching staff have access to computer technology.
- custodial/maintenance staff use electronic mail for District communications.

With the District Role of Non-Teaching Staff rating well on the way towards **Stage Four (HIGH)** where this stage is defined as:

- secretary(s) coordinates and maintains student records.
- secretary(s) uses advanced features of student records, reporting and word processing software.
- secretary(s) maintains computer accounting.
- support staff have convenient access to computer technology as appropriate and use e-mail to communicate within the District.
- custodial/maintenance staff use electronic mail for District communications, work orders, supplies, budget, work schedules and monitoring school security.

Additional information from surveys and interviews indicated that administrative uses of computer technology was rated very high. Major uses are in areas such as:

- general communication via paper and electronic means using word processing, spreadsheets, graphing, and presentation software;
- most School Administrators have laptops and use technology regularly for administrative tasks;
- student records and library automation using the Comprehensive Information Management for Schools software (CIMS) on the District computer, an AS/400;
- e-mail, list services, and web sites hosted by the Campbell River Community Network (CRCN);

- computer generated report cards; and
- District and some school web sites.

In addition, answers to the following selected questions from The District Teachers Survey and Questionnaire provide additional insights to the above views:

- **Question # 4. Computer and IT access is appropriate for administrative needs.**
  - Yes 70 %
  - No 21 %
  - Don't Know 9 %

  NOTE: About 70 % of teachers indicated that their computer and IT access is appropriate for administrative needs; while 21 % do not and 9 % do not know.

Similarly, answers to the following selected questions from The District Principals and Vice-Principals Survey and Questionnaire provide additional insights to the above views:

- **Question # 4. Computer and IT access is appropriate for administrative needs.**
  - Yes 100 %
  - No 0 %
  - Don't Know 0 %

  NOTE: 100 % of Principals and Vice-Principals indicated that their computer and IT access is appropriate for administrative needs.

■ **It is recommended that:**

71. ... the District continue the successful use of the administrative uses of computers.

72. ... the District continue to monitor BCeSIS developments for a potential timely and cost effective migration to this Provincial initiative

73. ... the District begin the long term planning for 'data warehousing', 'data mining', and 'data analysis' to improve student learning and achievement .

4.17 Management and Leadership

In general, the technology Planning and Leadership indicator from the School Technology Stage of Integration, Development, and Implementation assessment for the District was not rated very high by District staff. The results were:

INDICATOR	DISTRICT AVERAGE	DISTRICT RANGE
3. Planning and Leadership		
• **School**	**2.1**	**1.3 — 2.5**
• **District**	**2.2**	**1.6 — 2.7**

The Management and Leadership indicator was rated:

- at the School Level:
    - at a Stage Two (Low) or 2.1 out of 4 Stages of technology development. The range of this rating goes from a Stage 1.3 (Early) to a Stage 2.5 (Low/Medium). See the graph on the next page of all District Schools to see how the rating for Planning and Leadership — School Level compared to the other indicators.
- at the District Level:
    - at a Stage Two (Low) or 2.2 out of 4 Stages of technology development. The range of this rating goes from a Stage 1.6 (Early/Low) to a Stage 2.7 (Medium). See the graph on the next page of all District Schools to see how the rating for Planning and Leadership — district Level compared to the other indicators.

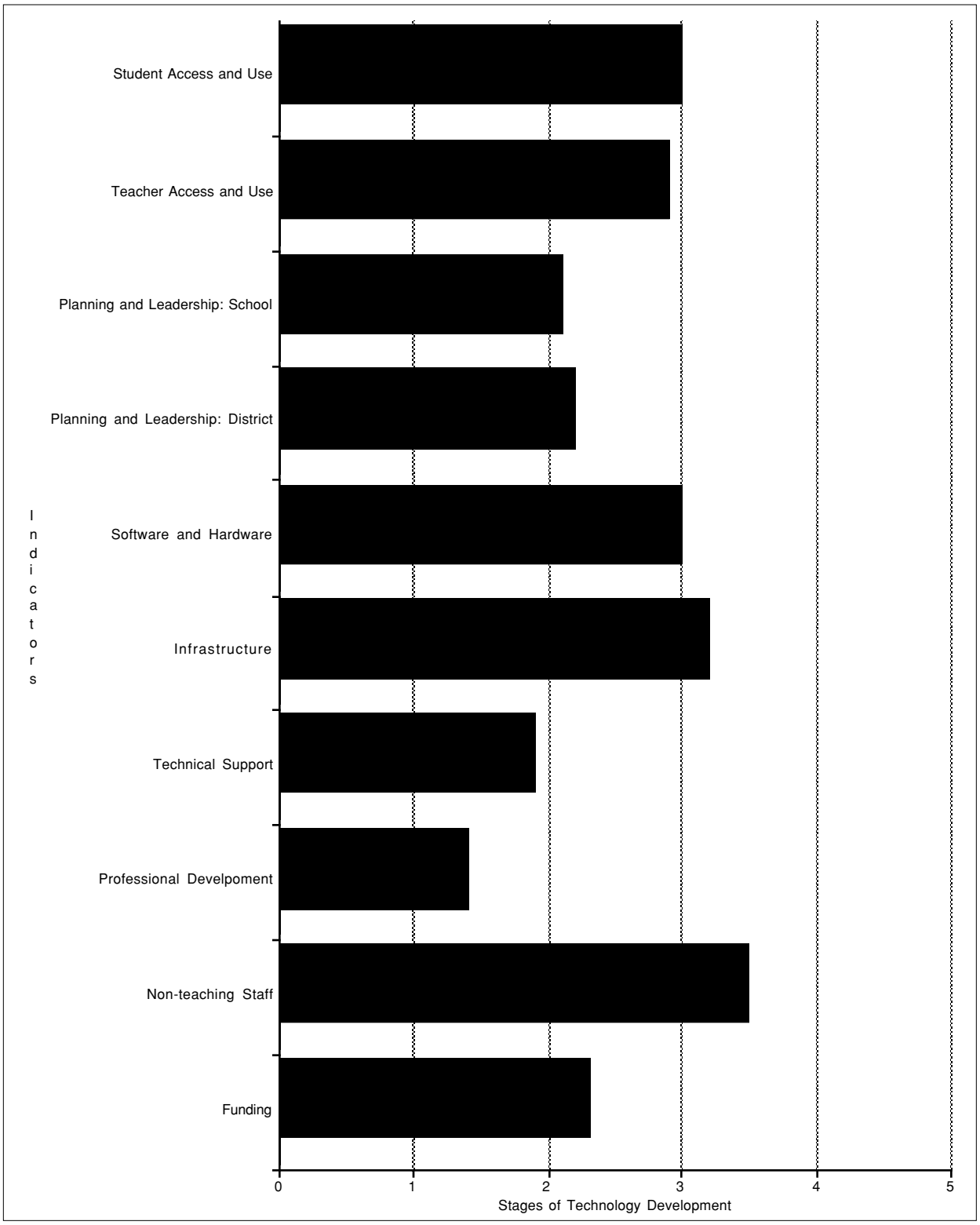
An interpretation of the graph (next page) indicates that the District Profile Graph for Elementary, Middle, and Senior schools is at the stage of technology development of:

- an average Stage of development of 2.5 and
- with a range of from Stage 1.4 to Stage 3.5.

Five indicators were MEDIUM reaching just below Stage Three (MEDIUM) to Stage 3.5 (HIGH MEDIUM) with respect to:

- Student Access and Use;
- Teacher Access and Use;
- Infrastructure;

Profile Graph of the Average Technology Stage of Integration, Development and Implementation for all District Schools



- Software and Hardware; and
- Non-teaching Staff.

Four indicators were about LOW at just below Stage Two (LOW) and just above Stage Two (LOW) with respect to:

- Planning and Leadership at the School Level;
- Planning and Leadership at the District Level;
- Technical Support; and
- Funding.

One indicator was low at between Stage One (EARLY) and Stage Two (LOW) with respect to:

- Professional Development.

The Planning and Leadership indicator at the school or District level was not high. This indicator is definitely and area for improvement at the school and District levels

It is recommended that:

74. ... the District develop a Three Year District Education Technology Plan that is renewed at least annually.

75. ... the District schools, departments, and centres develop Three Year District Education Technology Plans that are renewed at least annually and are aligned with District goals and the individual goals of District schools, departments, and centres.

76. ... the District, schools, departments, and centres Three Year Education Technology Plans should be comprehensive in scope — all learning resources and technologies.

77. ... the District develop minimum standards and benchmarks for all all learning resources and technologies, professional development, training, curriculum expectations, etc.

78. ... the District strengthen the use of monitoring, evaluation and data driven Education Technology decision making.

79. **... the District Education Technology Policy on Education Technology be updated to include such area as — laptops, evergreen of technology, teachers workplace computers, school libraries, special student needs, etc.**

80. **... the District restructure Technology Management Committee and reporting structure for management of all District education technology, infrastructure, and technical support with the need to have a structure that is more responsive and balanced to represent all District stakeholders.**

81. **... the District ensure that the overall management of all District education technology — Education Learning Technology Management and — Information Technology Management be a balanced structure where:**

- **Education Learning Technology Management is led by an educator or teacher that fully understands the implementation and use of technology to support instruction, curriculum and ICT skills for teachers and students and the improvement of student learning and achievement; and**
- **Information Technology Management is led by an expert that fully understands the implementation and use of technology software, hardware, infrastructure, and technical support.**

4.18 Annual Three Year Education Technology Plan

A description of the education technology planning concept/process can be reduced to three steps:

- determine where you are now (the present);
- determine where you want to go (the future); and
- plan and implement actions to ensure you move from the present to your desired future.

NOTE; The process in elaborating a plan is as important as the plan itself. The process should involve the stakeholders in a collaborative, consensus building process that results in widespread awareness and/or agreement.

A recommended and very useful six step planning concept/process is illustrated below (Apple Computer, 1991).

The above illustration is particularly useful because it emphasizes;

- that the Vision is the "driver' for planning efforts;
- simplicity with only six steps; and
- the planning process is cyclical and is renewed at least annually.

It is recommended that:

82. ... the District develop an initial three-year District Technology Plan and revise the Plan at least annually.

83. ... the District have each school, departments, and centres develop an initial three-year Technology Plan and revise the Plan at least annually. The school plan should align with the District plan and also include areas that address the individual needs of the individual school, departments, and centres .

84. ... the District involve as many staff, students, and community members as feasible in the technology planning process so that a broader understanding, participation and/or consensus is achieved. The process of planning, that involves as many people as feasible, is as important as the published plan.

85. … the District develop need to develop some areas in more detail as specific projects with specific detailed plans and revised these plans annually to reflect change and evolution in technology. For example a specific plan needs to be defined for a Student Laptop Project, for a Teacher Workplace Computer Project, and for a Technology Evergreening Project.

86. … the District develop a Design Team approach to all technology projects and that technology projects beyond a minimum set level cannot proceed without a review and plan developed by a Design Team. A reasonable standard is any project that requires the purchase of more then three workstations. This Design Team should include all relevant stakeholders.

5. Where We Are According to National and International Reports, Surveys, and Reviews

5.1 Canadian Reports, Surveys, and Reviews

There is little 'hard data' available on the status of education technology in Canada other than opinion and what is provided by:

- the Statistics Canada (2004) survey on *Connectivity and ICT Integration in Canadian Elementary and Secondary Schools: First Results From the Information and Communications Technologies in Schools Survey, 2003-2004* and the Canadian Teachers' Federation study as reported by O'Haire, N. (2003), *Teachers' Perspectives on Technology*.
- The Statistics Canada information, for the most part is dominated by data on numbers of computers, numbers of Internet connections and infrastructure, but there are some 'higher level' findings.
- In general, there is little Canadian data available on the impact of education technology on teaching and learning . The Ken Haycock (2003) study, *The Crisis in Canada's School Libraries: The Case for Reform and Reinvestment*, is included here because of the educational technology relationship, the recognition of the study across Canada, and the powerful research findings on student achievement.

Selected higher level findings on teaching, learning, and technology from Statistics Canada Survey (2004) follow:

- "... the foundations of ICT are present in the schools. Virtually all elementary and secondary schools in Canada had computers and were connected to the Internet. Overall, it is estimated that more than one million computers were available to students and teachers during the 2003/04 school year." (p. 29)
- "School computers are aging. Just under one-quarter of the elementary and secondary schools in Canada had the majority of their computers running on the most recent operating system." (p. 29)
- "According to school principals, most teachers possessed the technical skills to use ICT for preparing report cards, taking attendance or recording grades, while fewer teachers had the necessary qualifications to engage students in using ICT effectively to enhance their learning." (p. 29)

- "Financial challenges figure among the most extensive barriers to ICT use. The growth in ICT facilities and their use means that ICT management has become more complex, putting increased pressure on the school organization and operation. Nearly 67% of principals reported that 'having sufficient funding for technology' was an extensive challenge to using ICT in their school." (p. 30)
- "Despite the perceived financial challenges, more than nine principals out of ten (92%) either 'slightly agree' or 'strongly agree' that 'ICT is worth the investment'." (p. 30)

Selected findings from the Canadian Teachers' Federation Survey (2003) follow:

- "In spite of their extensive use of ICT, elementary and secondary teachers say they have little voice at their boards and schools in decision making about technology. They are concerned that they are not using ICT as well as they would like to and that they have no common vision about the future of ICT in education." (p. 22)
- "Teachers in the survey have accepted computers and ICT in their classes and are integrating ICT in their lessons. Nearly every teacher in the survey uses a computer (98%), and 8 out of 10 say computers are essential or important in the way they teach." (pp. 22-23)
- "Two thirds of teachers report using the Internet and instructional CD-ROMs in their classes. One third use desktop publishing for their classes, while half use spreadsheets, computer games, and simulations. Nearly half use Powerpoint and other presentation software." (p. 23)
- "... 71% agree that computers have changed how they teach and 77% think that computers have changed how students learn." (p.23)
- "Eight of 10 teachers surveyed use a computer to prepare lesson plans and 71% indicate that their students use the 'Net' for assignments." (p. 23)
- "One quarter of the elementary teachers indicate that students submit their assignments electronically and this rises to 44% at the secondary level. " (p. 23)
- "... 21% of the teachers surveyed say that students use notebook or laptop computers in class." (p. 23)
- "... in spite of the acceptance and use of classroom technology, 55% of those surveyed say there is too much emphasis on computers 'to the detriment of other important areas that would improve learning.'" (pp. 23-24)

- Most teachers ",,, feel they are not adequately trained to use computer technology in their classes and lesson plans. There is a significant opportunity for teacher organizations to take the lead in this part of a teacher's professional life." (pp. 24-25)
- "In spite of the agreement about the potential for using computers in schools, many feel that computers and other instructional technologies are unproven." (p. 25)
- "In the analysis of the data, Vector Research segmented the respondents into four groups:
    - Innovators (11%);
    - Adoptors (43%);
    - Skeptics (41%; and
    - Resistors (5%)." (p. 25)

        - "The Innovators (1 in 10) are driving ICT in education, use it very extensively, and are enthusiastic about it. 86% of this group say that ICT makes the teacher more productive and 91% say students learn more in less time using computers for instruction." (p. 25)
        - "Adopters, the largest group, use the Internet and other computer technology extensively, but are less enthusiastic than the Innovators." (pp. 25-26)
        - "Skeptics use fewer technologies and with less enthusiasm than Adoptors or Innovators." (p. 26)

Selected Findings from the Ken Haycock study on Canadian School Libraries (2003) follow:

- "...mounting empirical and anecdotal evidence indicates that Canada's school libraries are not at their best; far from it. Across the country, teacher-librarians are losing their jobs or being reassigned. Collections are becoming depleted owing to budget cuts. Some principals believe in the age of the Internet and the classroom workstation, the school library is an artifact." (p. 9)
- "Two leading U.S. researchers in the field offer this arresting conclusion: 'In research done in nine states and over 3300 schools since 1999, the positive impact of the school library program is consistent. [They] make a difference in academic achievement. If you were setting out a balanced meal for a learner, the school library media program would be part of the main course, not the butter on the bread' (Lance and Loertscher, 2003)" (p. 9)

- 'It seems somewhat strange to have to prove the self-evident benefits of a library, one of human civilization's greatest and more enduring institutions. But this is the daunting task confronting parents, educators, and advocates for Canadian school libraries and teacher-librarianship as they face steady and troubling disinvestment. Their challenge grows even more perplexing when policy-makers grope around for novel tactics to solve literacy concerns, the deployment of school-based 'literacy coordinators' — when there's a tried-and-tested solution close at hand." (p. 11)

5.2 International Reports, Surveys, and Reviews

There are many education technology reports and plans available internationally, particularly from the United States, the United Kingdom, Australia and the Organization for Economic Cooperation Development. The reports and plans vary in quality, but in general are a wealth of quality research, ideas, and advice on planning and implementing education technology in K-12 education systems.

There is little evidence that these materials are used to supplement the small, low quality research, ideas and advice that informs decision making in the planning and implementing of educational technology in the Canada K-12 education system. Many of these are cited in the Reference section, such as the following:

- U.K. Report (2003), *ICT and Attainment: A Review of the Research Literature*;
- U.K. Report (2004), *ICT in School: The Impact of Government Incentives Five Years On*;
- U. S. Report (2000). *Educational Technology Horizon Map 2001 - 2010*;
- U.S. Report (2002), *Technology in Schools: Suggestions, Tools, and Guidelines for Assessing Technology in Elementary and Secondary Education*;
- U. S. Report (2005). National Education Technology Plan 2004, *Toward a New Golden Age in American Education — How the Internet, the Law, and Today's Students Are Revolutionizing Expectations*;
- U.S. Report (2004), *Technology Counts 2004: Global Links: Lessons From the World*;
- U. S. Report (2005), *Technology Counts 2005: Electronic Transfer — Moving Technology Dollars in New Directions*;
- U. S. Report (2006), *Technology Counts 2006: The Information Edge: Using Data to Accelerate Achievement*;

- Australian Capital Territory Government (ACT) (2004), *Learning Technologies Plan for ACT Government Schools and Preschools 2004-2006: Transforming the Way We Teach and Learn*; and
- OECD Report (2003), *ICT and the Quality of Learning*.

For example, selected findings from the OECD Report (2003) indicate:

- "If the mere application of ICT within a school generally led to more student centered teaching, then countries that desired changes in that direction could focus resources solely on bringing a strong ICT infrastructure into schools and assuring that teachers used it in their teaching. The opposite finding, which is what we are reporting, leads to a different strategy wherein both the ICT infrastructure and the planning and professional development for pedagogical change are required to achieve more student centered teaching. "(p. 14)

and

- "In the colleges, universities, and normal schools, pre-service education needs to adjust to the digital world. Graduates of the teacher education programs should not only be comfortable with ICT applications but also should understand the importance of innovation and of change. Today's technology probably will not be tomorrow's technology. Knowing how to use a specific search engine is not as important as understanding the problems in organizing and retrieving information from systems like the World Wide Web. The European Computer Driver's License may represent ICT competency for today but for tomorrow more advanced understanding will be required." (p. 38-39)

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Attachment 1: List of Software, Hardware, and Network Infrastructure Recommendations by Priority

NOTE: Arranged from high priority to low priority.

1. Campbell River Schools should immediately investigate the installation of a firewall or system of firewalls in order to protect the resources within their schools.
2. Hire 1.0 Director of Technology to oversee all aspects of technology and technology-related items.
3. Hire 1.0 additional technician just to take care of the network, and network-related infrastructure.
4. Convert the existing "temporary" technician into a permanent position.
5. Hire at least 0.2 FTE clerical, and potentially 1.0 including Help Desk Functions.
6. Campbell River Schools create a centrally managed Technology Evergreen plan incorporating all computers in classrooms, labs, and offices, all printers, and various other technologies. This plan could be funded on a per student basis out of the annual education grant moneys.
7. Hire 1.0 additional technician if the fleet of computers should increase in a major way, the example being perhaps in placing a computer on each staff members desk.
8. Software Acquisition should be moved into the technology department for purchasing, administration, and tracking. A centralized database should be created which references the work order and asset tracking systems to better organize software licenses.
9. All hardware acquisition be done through the Tech Department directly, with input, analysis, and research shared amongst stakeholders. The department should standardize on a particular vendor, or at least a particular hardware that can be identically supplied through multiple sources.
10. The Tech Department should be involved in all aspects of technology acquisition, especially as it connects to the network.
11. Campbell River Schools should investigate a replacement work order system for the one that is currently in use for the Tech Department. This could be an off-the-shelf product, or an internally generated product. If staff internally could build it, it would be more likely to meet their needs, and just might be less costly in the long run.

12. Campbell River Schools expand the scheduled visits system such that technicians actually spend more time in the schools on scheduled visits, than on work order, or emergency visits.
13. Help Desk personnel should consist of the regular technicians who can provide expert support to school staff.
14. Campbell River Schools should investigate the development of a new web-based inventory system that links directly with the work order system to allow for more efficient use of time, and better record keeping.
15. That Campbell River install at least one QoS capable data switch in each site at the very minimum, but preferably in each wiring closet. This vendor should match the data gear selected for the non-QoS areas.
16. Campbell River Schools should consider housing their own internal mail server. It will certainly add to the cost and the load of the tech support staff, but the measurable benefits should outweigh the costs.
17. Campbell River Schools tech support department should implement either a centralized, or round-robin backup plan for school servers as they had explained to the reviewer.
18. Campbell River Schools should incorporate a single file server access across platforms. Using either the Novell server or the Mac OS X as the file server for all platforms.
19. That Campbell River Schools select a hardware vendor as their data networking standard, and keep that vendor for a significant period of time. At least 3 years.
20. Campbell River Schools, working with PLNet, move to a privately addressed network.
21. Each Campbell River School should have it's own local DHCP server providing addresses to their local site.
22. Campbell River Schools should evaluate their decision to remove caching proxy servers from the local schools, and consider implementing them again. With the goal of more effectively managing both their traffic, and their bandwidth.
23. Campbell River Schools should take a good look at their antivirus solution. Should they choose to maintain the Symantec Antivirus setup, then the server must be monitored on a daily basis to ensure updates are occurring. Further, monitoring the server will also indicate whether or not the workstations are also receiving updates, and are ready for the threat of new viruses as they are released.

24. Campbell River Schools appoint a small committee to research and investigate the feasibility of providing standardized access to school resources to staff members at home. This investigation should include research into the costs associated, both soft, and hard, with providing this service to staff, and also incorporate how security could be handled.
25. Campbell River Schools should continue the practice of installing redundant hard drives in their servers, and seriously consider making redundant drives a part of the existing server fleet.
26. Some clerical support time should be added to the technical support department, so that minor areas of paperwork can be completed in a reasonable timeframe.
27. Some FTE of clerical support be added to the technical support department to be a central point of incoming phone calls and messages.
28. Pagers could be replaced with cell phones, ensuring quicker response time, and a better use of time.
29. Technicians be allocated items based on the school, or based on a skills list that could be maintained by the clerical staff.
30. Campbell River Schools should be applauded for their attempt to try the LINUX terminal server lab environment. This project should not be scrapped, rather enhanced with some additional tools to make the lives of teachers easier. Further, more research and testing should be completed to determine where these labs are best utilized, and where their benefits and potential are greater. Care should be taken to ensure the needs of the school are met.
31. Campbell River Schools should look at photocopier replacement with a fully digital fleet, across the system, in order to realize tremendous cost savings, and removing costly network laser printers.
32. Campbell River Schools should undertake some manner of internal review, working with a group of it's stakeholders, to examine the platforms that are supported and the reasoning behind this support.
33. Campbell River Schools Technology Management Committee should ensure that their work is transparent, consistent, and has some representation from the Tech Department. This will help ensure that people's perceptions become more accurate, and as a result, the strength of this committee may become more evident.

Attachment 2: List of Software, Hardware, and Network Infrastructure Recommendations by Cost

NOTE: Arranged from high cost to low cost.

1. Hire 1.0 Director of Technology to oversee all aspects of technology and technology-related items.
2. That Campbell River install at least one QoS capable data switch in each site at the very minimum, but preferably in each wiring closet. This vendor should match the data gear selected for the non-QoS areas.
3. Hire 1.0 additional technician just to take care of the network, and network-related infrastructure.
4. Hire at least 0.2 FTE clerical, and potentially 1.0 including Help Desk Functions.
5. Convert the existing "temporary" technician into a permanent position.
6. Hire 1.0 additional technician if the fleet of computers should increase in a major way, the example being perhaps in placing a computer on each staff members desk.
7. Campbell River Schools should immediately investigate the installation of a firewall or system of firewalls in order to protect the resources within their schools.
8. Campbell River Schools should consider housing their own internal mail server. It will certainly add to the cost and the load of the tech support staff, but the measurable benefits should outweigh the costs.
9. Some clerical support time should be added to the technical support department, so that minor areas of paperwork can be completed in a reasonable timeframe.
10. Some FTE of clerical support be added to the technical support department to be a central point of incoming phone calls and messages.
11. That Campbell River Schools select a hardware vendor as their data networking standard, and keep that vendor for a significant period of time. At least 3 years.
12. Campbell River Schools, working with PLNet, move to a privately addressed network.
13. Each Campbell River School should have it's own local DHCP server providing addresses to their local site.

14. Campbell River Schools should evaluate their decision to remove caching proxy servers from the local schools, and consider implementing them again. With the goal of more effectively managing both their traffic, and their bandwidth.
15. Campbell River Schools should take a good look at their antivirus solution. Should they choose to maintain the Symantec Antivirus setup, then the server must be monitored on a daily basis to ensure updates are occurring. Further, monitoring the server will also indicate whether or not the workstations are also receiving updates, and are ready for the threat of new viruses as they are released.
16. Campbell River Schools appoint a small committee to research and investigate the feasibility of providing standardized access to school resources to staff members at home. This investigation should include research into the costs associated, both soft, and hard, with providing this service to staff, and also incorporate how security could be handled.
17. Campbell River Schools should continue the practice of installing redundant hard drives in their servers, and seriously consider making redundant drives a part of the existing server fleet.
18. Campbell River Schools should incorporate a single file server access across platforms. Using either the Novell server or the Mac OS X as the file server for all platforms.
19. Campbell River Schools tech support department should implement either a centralized, or round-robin backup plan for school servers as they had explained to the reviewer.
20. Campbell River Schools should investigate a replacement work order system for the one that is currently in use for the Tech Department. This could be an off-the-shelf product, or an internally generated product. If staff internally could build it, it would be more likely to meet their needs, and just might be less costly in the long run.
21. Campbell River Schools expand the scheduled visits system such that technicians actually spend more time in the schools on scheduled visits, than on work order, or emergency visits.
22. Help Desk personnel should consist of the regular technicians who can provide expert support to school staff.
23. Campbell River Schools should investigate the development of a new web-based inventory system that links directly with the work order system to allow for more efficient use of time, and better record keeping.
24. Pagers could be replaced with cell phones, ensuring quicker response time, and a better use of time.

25. Technicians be allocated items based on the school, or based on a skills list that could be maintained by the clerical staff.
26. Software Acquisition should be moved into the technology department for purchasing, administration, and tracking. A centralized database should be created which references the work order and asset tracking systems to better organize software licenses.
27. All hardware acquisition be done through the Tech Department directly, with input, analysis, and research shared amongst stakeholders. The department should standardize on a particular vendor, or at least a particular hardware that can be identically supplied through multiple sources.
28. Campbell River Schools should be applauded for their attempt to try the LINUX terminal server lab environment. This project should not be scrapped, rather enhanced with some additional tools to make the lives of teachers easier. Further, more research and testing should be completed to determine where these labs are best utilized, and where their benefits and potential are greater. Care should be taken to ensure the needs of the school are met.
29. Campbell River Schools should look at photocopier replacement with a fully digital fleet, across the system, in order to realize tremendous cost savings, and removing costly network laser printers.
30. The Tech Department should be involved in all aspects of technology acquisition, especially as it connects to the network.
31. Campbell River Schools should undertake some manner of internal review, working with a group of it's stakeholders, to examine the platforms that are supported and the reasoning behind this support.
32. Campbell River Schools Technology Management Committee should ensure that their work is transparent, consistent, and has some representation from the Tech Department. This will help ensure that people's perceptions become more accurate, and as a result, the strength of this committee may become more evident.
33. Campbell River Schools create a centrally managed Technology Evergreen plan incorporating all computers in classrooms, labs, and offices, all printers, and various other technologies. This plan could be funded on a per student basis out of the annual education grant moneys.

Attachment 3: Stages of School Educational Technology Integration, Development, and Implementation

The ALTIS Group has identified the following four stages of technology development and nine indicators of integration and implementation. The four stages were revised with input from the Campbell River School District Technology Management Committee and The ALTIS Group.

3.1 Stage One Integration, Development, and Implementation

The first stage is characterized by early versions of hardware in stand-alone configurations which are not part of a school local area network. One or two teachers are the 'experts' who teach, plan, make purchases and provide technical support for the the school. The focus is on the technology itself and, therefore, courses such as Computer Studies predominate. Characteristics of Stage One Implementation are:

1. Student Access and Use
- students use computer technology infrequently or not at all.
- computer technology is used only in courses such as Computer Literacy or Computer Studies.
- students have access to computer technology in special locations such as labs or libraries.

2. Teacher Access and Use
- teachers do not use computer technology for record-keeping or reporting.
- teachers have little or no access to computer technology at school.

3. Planning and Leadership
- **School Level**
  - occasional planning.
  - one or two computer 'experts' teach, plan and make purchasing decisions.
- **District Level**
  - occasional planning.

4. Software and Hardware
- students use computer software and hardware infrequently or not at all.
- primarily Apple II, Macintosh 020 and PC 286 computer technology.

5. Infrastructure/Networking
- stand alone computer technology.

6. Technical Support
- teacher computer 'experts' provide on-site support.

7. Professional Development
- other professional development needs take priority over computer technology.
- one or two teachers attend workshops, conferences and external training programs.
- the focus of professional development is on hardware and software skills.

8. Role of Non-teaching Staff
- secretary(s) uses all student records and reporting software and word processing software.
- other non-teaching staff have little or no access to computer technology at school.

9. Funding
- the school makes available only those funds that are directed to technology by the District.

3.2 Stage Two Integration, Development, and Implementation

Stage two has more teachers beginning to learn about computer technology and student access increases to a weekly basis. Some teachers are integrating computer technology into some subject areas. As hardware and software are upgraded, there is a mixture of old and new computer technology. Professional development opportunities increase but the focus is still on hardware and software.

1. Student Access and Use
- students use computer technology on a regular weekly basis for special projects or as a reward.
- computer technology is occasionally integrated into subject areas, but is primarily used in courses such as Information Technology or Computer Studies.
- students have access to computer technology in special locations such as labs or libraries.

2. Teacher Access and Use
- teachers use computer technology for some record-keeping or reporting.
- teachers share access to computer technology in staff only school locations.

3. Planning and Leadership
- **School Level**
  - occasional planning.
  - principal plays limited role in planning and implementation.
  - fewer than half of staff are involved in planning and making purchasing decisions.
- **District Level**
  - occasional planning.
  - District plays limited role in planning and implementation.
  - few schools are involved in planning and making purchasing decisions.

4. Software and Hardware
- students use computer software and hardware on a regular weekly basis for special projects or as a reward.
- a mixture of Macintosh 020, Power PC and/or PC 486/Pentium II and III computer technology.

5. Infrastructure/Networking
- some school based local area networks are in place.
- some peer-to-peer networks and resource sharing, but mainly stand alone computer technology.
- library card catalogue is automated for circulation, inventory and management.
- schools have limited access to the Internet and the World Wide Web.

6. Technical Support
- specialized technical support is acquired as needed from District office or external sources.
- teacher computer 'experts' continue to provide on-site support.

7. Professional Development
- one professional development day per year is devoted to computer technology.
- a few teachers make computer technology upgrading a personal priority. They attend workshops, conferences and external training programs.
- the focus of professional development is on hardware and software skills.

8. Role of Non-teaching Staff
- secretary(s) uses all student records and reporting software and word processing software.
- secretary(s) prints out principal's electronic mail.
- other non-teaching staff have access to computer technology.

9. Funding
- funding is available from various sources within the school's budgets for technology.

3.3 Stage Three Integration, Development, and Implementation

In stage three computer technology becomes a regular tool for learning and for teaching when they are located in all classrooms and learning locations. The school has a local area network and the focus shifts to integrating computer technology into subject areas. Planning for computer technology is an ongoing component of school planning.

1. Student Access and Use
- computer technology is used in all subject areas as appropriate.
- students use computer technology regularly as needed.
- students have access to clusters of computers in all classrooms and learning locations.
- special needs students have access to computers either through SETBC or through District resources or Learning Assistance Rooms.

2. Teacher Access and Use
- computer technology is used in all subject areas as appropriate.
- teachers use computer technology regularly for planning, record keeping and reporting.
- teachers have convenient access to computer technology at school and from home.

3. Planning and Leadership
- **School Level**
  - regular, scheduled short term and long term planning.
  - principal plays a leadership role in planning and implementation.
  - staff are involved in planning and making purchasing decisions.
- **District Level**
  - regular, scheduled short term and long term planning.
  - District plays a leadership role in planning and implementation.
  - schools are involved in planning and making purchasing decisions.

4. Software and Hardware
- students use computer software and hardware regularly as needed.
- all teachers have a computer designated for their specific use.
- primarily Macintosh PowerPC, iMac and Pentium II and III computer technology.
- library is automated for circulation, inventory and management.

5. Infrastructure/Networking
- classroom, library and office computers are connected through a school-wide local area network which includes electronic mail.
- the school local area network is connected to the District wide area network and the Internet.
- a few key school-level record keeping, transactions and reporting functions are network based, e.g., daily attendance.

6. Technical Support
- on-site technical support is provided by non-teaching staff and specialized technical support is acquired as needed from District office or external sources as appropriate.

7. Professional Development
- professional development is provided at the same time as new computer technology changes and/or is introduced.
- the majority of staff make computer technology upgrading a personal priority. They attend workshops, conferences and external training programs.
- the focus of professional development is on computer technology integration.

8. Role of Non-teaching Staff
- secretary(s) uses advanced features of student records and reporting software, word processing software and implements computer accounting.
- other non-teaching staff have access to computer technology.
- custodial/maintenance staff use electronic mail for District communications.

9. Funding
- there are some defined technology goals and budgets set by the school staff.

3.4 Stage Four Integration, Development, and Implementation

Stage four is characterized by a transformation of learning, teaching and administrative functions because of advanced integration of computer technology. Student and teacher use of computer technology is linked directly to the improvement of student academic achievement. Communications technology are used to link the school to the home and to link students and teachers to their peers around the world.

1. Student Access and Use

- student use of computer technology is linked directly to the improvement of student curriculum outcomes and academic achievement.
- student role, productivity and learning is enhanced and improved through the use of computer technology.
- computer technology is used in all subject areas as appropriate.
- students use computer technology on a regular basis as needed.
- students have access to computer technology throughout the school and from home.
- some students complete course(s) from home.
- students collaborate with experts and with other students from around the world to solve interdisciplinary problems.
- special needs students have access to appropriate intervention technologies either through SETBC or through the District Special Education services.

2. Teacher Access and Use

- teacher use of computer technology is linked directly to the improvement of student curriculum outcomes and student academic achievement.
- the teachers role, productivity and learning is enhanced and improved through the use of computer technology.
- teachers use computer technology regularly for planning, record-keeping and reporting.
- teachers have convenient access to computer technology at school and from home.
- teachers collaborate electronically with colleagues to plan and provide learning experiences for students.
- some teachers teach students on-line in a virtual school context.

3. Planning and Leadership

- **School Level**
  - regular, scheduled short term and long term planning and a three year School Educational Technology Plan updated annually.
  - Principal and Vice-principal(s) use technology regularly and play a leadership role in planning and implementation both within school and District.
  - staff are involved in planning and making purchasing decisions.
- **District Level**
  - regular, scheduled short term and long term planning and a three year District Educational Technology Plan updated annually.
  - District senior administrators use technology regularly and play a leadership role in planning and implementation both within schools and District.
  - staff are involved in planning and making purchasing decisions.
  - a refresh plan has been developed to replace aging technologies.

4. Software and Hardware

- computer software and hardware are used in all subject areas as appropriate.
- all teachers have a computer designated for their specific use.
- computers are available throughout the school in all key locations – classrooms, labs, libraries, special education rooms, administrative offices.
- a mixture of Macintosh G3 to G5 technology, Pentium II to IV, Celeron and next generation technologies are available.
- advanced peripheral computer technology is available as appropriate, e.g., digital photo, digital video cameras, interactive white boards, and data projectors.

- students and teachers have access to automated school library collections and online reference collections such as World Bookonline, in all school locations and at home.
- integrated, web-based curriculum, assessment and information systems that provide curriculum content and bring together all student data are being implemented or under consideration, i.e., Plato, SuccessMaker, RiverDeep, Renaissance Learning.
- the school follows a District set of standard hardware configuration.
- the school follows a District set of standards for software.

5. Infrastructure/Networking

- classroom, library and office computers are connected through a school-wide local area network.
- the school local area network is connected to the District wide area network and the Internet.
- the school follows a District integrated communications system including e-mail, FAX, Voice and other services implemented throughout the District.
- students, teachers, parents and administrators have access to selected school/District online resources from the home or other off-site locations.
- the general public has access to information about school/District services and resources and the District web sites is used as a key communications service.
- all key school-level record keeping, transactions and reporting functions are network based.

6. Technical Support

- on-site technical support is provided by non-teaching staff and specialized technical support is acquired as needed from District office or external sources as appropriate.
- the school follows a District disaster recovery plan.

7. Professional Development

- technology training and professional development is an integral part of the school's technology plan.
- the majority of staff make computer technology upgrading a personal priority. They attend workshops, conferences and external training programs.
- the focus of professional development is to improve student achievement, computer technology integration and transforming learning and teaching with computer technology.

8. Role of Non-teaching Staff

- secretary(s) coordinates and maintains student records.
- secretary(s) uses advanced features of student records, reporting and word processing software.
- secretary(s) maintains computer accounting.
- support staff have convenient access to computer technology as appropriate and use e-mail to communicate within the District.
- custodial/maintenance staff use electronic mail for District communications, work orders, supplies, budget, work schedules and monitoring school security.

9. Funding

- there are clearly defined technology goals and budgets set by the school staff.

Attachment 4: Distict Grades 3, 6, 9 and 12 Student Computer Technology Outcomes

School District 72 (Campbell River) May 31, 2001

Student Computer Technology Outcomes for the End Of Grade 3

A. Knowledge

The student will use technology to:

1. Find and collect information from an electronic source.
2. Search electronically and locate materials in the library.

B. Applications

The student will use technology to:

1. Produce a text document from draft to completion.
2. Produce a graphic document.

C. Social/Ethical Issues

The student will use technology to:

1. Access the internet applying rules of safety.

Student Computer Technology Outcomes for the End Of Grade 6

A. Knowledge

The student will use technology to:

1. Search electronically and locate materials in the library.
2. Display correct home row fingering while creating a word processing document.

B. Application

The student will use technology to:

1. Produce a document employing text and graphics.
2. Use spreadsheets and databases to store, organize, manipulate, and present electronic information in a subject area context.

C. Social/Ethical Issues

The student will use technology to:

1. Use information from the Internet, library, and other sources ethically and safely and be able to cite references correctly.
2. Communicate with others electronically applying rules of safety.

Student Computer Technology Outcomes for the End Of Grade 9

A. Knowledge

The student will use technology to:

1. Operate effectively in a network environment:
    a. Login to a network;
    b. Access and save files from different locations;
    c. Access and utilize shared network devices; and
    d. Employ security measures: e.g. discreet login, change password, etc.
2. Demonstrate proper keyboarding technique.

B. Application

The student will use technology to:

1. Develop curricular-based multimedia presentations.
2. Access, organize and present electronic information.
3. Evaluate information to determine its relevancy, bias and/or appropriateness.
4. Access Internet resources and electronic mail to interact with peers, experts and others to investigate issues and gather information for curriculum related projects.

C. Social/Ethical Issues

The student will use technology to:

1. Demonstrate ethical and responsible use of information technologies.
2. Identify and demonstrate the advantages and disadvantages of using various technologies and the reliance society has on them.

Student Computer Technology Outcomes for the End Of Grade 12

A. Knowledge

The student will use technology to:

1. Demonstrate basic word processing skills including proficiency with keyboarding.
2. Copy, paste, edit, compose and save information from the Internet to a word processor.
3. Import and manipulate graphics.
4. Demonstrate basic file management skills – how to save, open, find, and organize files on the network.
5. Cite electronic sources (bibliographic data).

B. Application

The student will use technology to:

1. Select the appropriate application when presented with a task.
2. Use word processing and related software effectively and appropriately for the writing process and document production
3. Access, evaluate and effectively use information from electronic sources for:
    a. research;
    b. problem solving; and
    c. decision making.
4. Manage and communicate information:
    a. Over the Internet (e.g., research, discussion lists, e-mail correspondence) and
    b. Within an Intranet (e.g., submitting assignments through the network.)
5. Create curriculum-based, purposeful presentations (e.g. PowerPoint, Web, Multimedia, etc.).

C. Social/Ethical Issues

The student will use technology to:

1. Demonstrate ethical and responsible use of e-mail and the Internet.
2. Critically identify and analyze the social implications of technological change.