Guyana Education Access Project (GEAP)

Preparing for IT Labs and Planning for Sustainability

Ministry of Education / Department for International Development

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For MOE, DFID and C*f*BT.

CONTENTS

TERMS

CA	Crown Agents
CDROM	Compact-Disc Read-Only Memory
CT	Computer Traders
CLRC	Correntyne Learning Resource Centre
CPCE	Cyril Potter College of Education
CWSS	Christianburg Wismar Secondary School
CXC	Caribbean Examinations Council
DC	Design Collaborative
DNS	Domain Name Server (used to link IP address to computer name)
GEAP	Guyana Education Access Project
GOG	Government of Guyana
GT&T	Guyana Telegraph and Telephone
INSET	In-school Education or Training for teachers
ITA	Information Technology Administrator
IP Address	Internet Protocol Address – always of the form x.x.x.x where x is a number between 0 and 254
LFSS	Linden Foundation Secondary School
LLRC	Linden Learning Resource Centre
MHS	Mackenzie High School
MISU	Management Information Systems Unit, MOE
MOE	Ministry of Education
MS	Microsoft
NCERD	National Centre for Educational Resource Development
NIC	Network Interface Card
NMS	Network Management Software
NSSS	New Silvercity Secondary
NT	New Technology (as in Windows NT – an operating system with built in networking software)
PAR	Project Area Region
RED	Regional Education Department
SSRP	Secondary Schools Reform Project
TCP/IP	Transmission Control Protocol / Internet Protocol (A set of rules for computer communication)
Tec. Voc.	Technical Vocational
TSC	Teaching Service Commission
UPS	Uninterruptible Power Supply

EXECUTIVE SUMMARY

Over the past few years Guyana schools have continued to increase their use of Information Technology to teach students, support teachers and improve the efficiency of school administration. This new technology has many potential benefits but also many implications in terms of resource management, technical support and staff training. If the technology is to be at its most effective, it is likely that long-established systems and attitudes may need revision.

The Guyana Education Access Project has installed four IT labs in schools and CPCE Centres and has plans to install six more within the next two years. The project has learnt much from its experiences and is keen to record and learn from these experiences. It now faces three hurdles:

i. How to improve the installation and training process for the forthcoming IT labs.
ii. How to share best-practice with MOE, NCERD, MISU and other agencies and projects.
iii. How to increase the chances of sustainability.

This report seeks to help the project over these hurdles by proposing several initiatives in order to address them. Specifically the aims of the report are to:

i. Detail technical and training activities that took place during the consultancy visit in order to prepare more fully for the forthcoming GEAP IT laboratories.
ii. Provide a review of GEAP IT activities to date and enough background information in order to inform plans for the IT input to the end of the project and suggest a possible framework of MOE/MISU activities within which GEAP inputs could fit.
iii. Provide a summary of the consultancy activities that took place in order to support initiatives that promote replication and sustainability by recording and sharing experience.

Key Recommendations

Preparing for New GEAP IT Labs (§2.3)

- Careful preparation is needed by GEAP in order to clarify communication links and responsibilities between the project management, architects and IT team.
- GEAP will need to revise the ITA Network Management Guide for the forthcoming installations. This guide (and training if any) should be shared with MISU.

IT Sustainability (§3.6)

Clear leadership is needed from the MOE, MISU and/or NCERD with respect to several IT issues:

- Educational Aims, Management Principles and Procedures for IT Labs.
- IT Curriculum Content.
- IT/Education Budget and Technical Support Systems.
- The Role of the school ITA.
- Teacher Training, Retraining and Retention.
- Web Site Development.

In order to support this process GEAP needs to support the MOE/NCERD by:

- Continuing work on ICT curriculum, Alternative Learning Pathways and IT teaching methodologies.
- Sharing good practice with regards to IT management, technical support, teacher training and web site development.
- Evaluating GEAP IT experience and proactively sharing the results of such an evaluation with the relevant bodies.

1 TERMS OF REFERENCE

1.1 Full Title of Consultancy

"Preparation for the installation of further GEAP IT Laboratories / A review of GEAP plans for IT Teacher Training to the end of the project / Planning for sustainability, including recording the lessons of GEAP's IT developments (technical and pedagogic), in support of MoE's planned expansion of secondary education."

1.2 Background

The Guyana Education Access Project is working with MoE to pilot wider access to secondary education in its two target zones within Regions 6 and 10. Inputs are focused on:

- Provision of new / refurbished schools
- Increasing access and participation
- Improving teaching & learning
- Improving educational management
- Procurement of support resources (computers, books and teaching/science materials)

Under Outputs 1, 4 & 5 of GEAP, Information Technology (IT) infrastructure has been installed and IT training courses for teachers have been conducted during the period March 2000 – June 2002. The largest infrastructure installation has been the two school networks at Christianburg Wismar Secondary School (CWSS) in Region 10 and Tagore Memorial Secondary School (TMSS) in Region 6. In addition, two smaller networks have been provided in Linden, Region 10 and Rosehall, Region 6 in the two Cyril Potter College of Education (CPCE) Outreach Centres. There has also been an IT input to the Learning Resource Centre in Linden, with plans underway for a similar input of computers & IT software to the Learning Resource Centre at Village 48 in Region 6.

Teacher-training started in September 1999 and was initially at two levels. Basic IT training for all provided teachers with the skills to use computers to support their teaching. Intermediate training was provided for those trained teachers with some IT knowledge in order that they can become the IT Administrator (ITA) for their school – a teacher that can teach IT, support other teachers and maintain the equipment.

IT teacher-training over the past year has been at an advanced level and has been delivered by GEAP staff, along with trainers from Cyril Potter College of Education (CPCE) and the University of Guyana (UG). ITAs from all secondary schools in the project regions have attended sessions in Linden, Region 6 and Georgetown for a few days each month.

IT Teaching of school students started in CWSS and TMSS in September 2000. GEAP IT staff have provided support for the new IT teachers of these schools, including technical support, informal pedagogical advice and web-site development. The installation of Network Management Software last year and the ongoing development of the IT capacity of both schools and GEAP IT staff has resulted in a much reduced number of serious and long term network faults.

Ministry of Education capacity for IT has been supported at various levels. GEAP has written teacher-training modules for CPCE, supported the organisation of IT-Education conferences at the National and Regional levels and worked with schools to trial alternative learning pathways for IT for the 14-17 age range.

1.3 Current Issues

The major project development & implementation issues facing the GEAP IT team at this time are:

- Preparing for the installation and set-up of new IT laboratories at Skeldon Line Path, Skeldon High and Linden Foundation as these schools approach completion.
- Helping plan for the sustainability of the GEAP IT inputs beyond the end of the project (now only 18 months away).
- Ensuring the lessons, both technical and educational, which GEAP can provide the Ministry in terms of replication are properly documented and made available to all relevant departments / personnel.

The activities within this consultancy were in line with the appropriate sections of the recently agreed GEAP Action Plan which covers the period June 2002 - December 2003.

This (2nd) technical support visit supported the GEAP IT Team (Ms Kim Spencer & Mr Richard Ramnarine) in planning for the achievement of objectives in the above 3 areas. Specific consultancy objectives are listed below.

1.4 Objectives and Outcomes

Objectives and outcomes for the consultancy were set as follows:

Objective	Outcome	§
Undertake network installation training (including wiring and testing) for the GEAP IT Team and other staff as deemed relevant. Support a full integrity check of existing networks, using the results to inform ongoing informal technical training of GEAP IT team.	The GEAP IT Team will be better prepared to carry out installation of the new GEAP school laboratories The network cabling of the IT Labs at CWSS and CPCE centres will have been rationalised and made more permanent CWSS and TMSS Labs will have been checked and any networking problems resolved The IT systems at the 2 CPCE Outreach Centres will also have been checked	2
Review GEAP IT activities as identified in the Action Plan, supporting the IT team with specific issues within the A/Plan as appropriate. Develop a timetabled plan to include relevant "exit-strategies". Address issues of sustainability with MoE.	Draft outlines for GEAP IT planning with particular reference to "exit strategies" for technical support and teacher-training will have been discussed with MoE / MIS Department (as appropriate) and agreed on	3.2 3.4 3.6
Support further development of the GEAP IT team as requested, including web-site development, teaching methodology etc.	The GEAP and NCERD web sites will have been updated	3.5 3.6
Liaise with GEAP Subject Specialist for Alternative-Learning-Pathways in order to investigate development of technical-vocational model for IT teaching and learning in school	Draft outlines of an IT input to the MoE's Tech/Voc Task Force-led development of an Alternative Curriculum will have been discussed with appropriate MoE personnel	3.1 3.6
Liaise with the Project Director on plans for GEAP Papers to record the lessons of GEAP's IT experiences in support of replication	Draft outlines for 2 "GEAP Papers" covering IT issues relevant to MoE USE/replication plans will have been drawn up & a timetable for completion of the papers agreed	3 and separate documents

1.5 Programme

A total of 12 working days (spread over 13 actual days) were spent in the field. 2 days were allowed for report writing giving a total of 14 days. The programme was as follows:

Day	Task	Personnel
1	Network check of CWSS MISU demonstration of School Information Software Meeting – review, planning, GEAP Papers	SJW, CWSS Staff SJW, KS, RR, SB
2	Meeting – MISU Purchase specialist items for network installation training.	SJW, KS, SB, MISU KS
3	Travel to Region 6 Meeting – review and planning	SJW, KS SJW, KS, RR
4	GEAP IT Paper planning Network Cabling Workshop 1 - • Network Cabling Theory, Patch and Crossover Cables • Peer-to-peer networking of GEAP Office Review of Open-Source and CAL packages	SJW, KS, RR
5	Web-Site Development Network check of TMSS Testing of patch cables Installation of CAL packages	SJW, RR, KS
6	Travel to Georgetown Meeting – GEAP Papers	SJW SJW, SB
7	Meeting – Web site development Web site development and report writing	SJW, SB SJW
8	Uplift networking components Travel to Linden Meeting – CPCE IT Meeting – CPCE IT Lab plans Network check of Linden CPCE Preparation for cabling installation	SJW, KS SJW, KS, RR SJW, KS, RS SJW, KS, MP, RR SJW, KS, RR
9	Network Cabling Workshop 2 – • Network planning • Horizontal Wiring, Keystones and Patch panels • Testing of cabling	SJW, KS, RR
10	Network Cabling Workshop 3 - • Installation of workstations, Testing and troubleshooting	SJW, RR, KS
11	Completion of Network installation at Linden CPCE Tidying of IT Lab Review of activities	SJW, RR, KS
12	Installation of print servers and software Installation of CAL packages GEAP Paper drafting Meeting – Alternative Learning Pathways	RR RR KS SJW, SC
13	Web site development Meeting - GEAP Paper, GEAP IT Planning	SJW, KS

2 PREPARING FOR NEW GEAP IT LABS

2.1 Background

(For a more detailed background to the GEAP IT Lab initiatives please see previous consultancy report from November 2001).

2.1.1 GEAP School IT Labs

The two GEAP IT labs were installed in **February 2000** by a local computer firm – Computer Traders. Following an unsatisfactory installation and the non-delivery of Network Management Software the GEAP contract with Computer Traders was terminated in early 2001.

From **March 2000** until August 2001 both IT labs were used by GEAP to train local teachers. In **September 2000** both schools started to use the labs to teach students in Forms 3, 4 and 5.

In **July 2001**, GEAP Region 10 IT staff finished their contracts. There were no replacements employed, either by GEAP or MOE. The GEAP IT Team was halved in number, leaving the two lesser-experienced and qualified region 6 staff to support both regions.

By **September 2001**, both labs had so many software problems that the GEAP IT staff had to advise schools that they be closed for maintenance.

In **October 2001**, a technical consultancy supported a complete network software rebuild by the GEAP IT Team. Following testing and troubleshooting the long-awaited Network Management Software was installed.

IT Labs are planned for each of the remaining six GEAP Schools (2 in Region 6, 4 in Region 10). There are no more Resource Centres planned.

2.1.2 GEAP/CPCE IT Labs and Resource Centres

The GEAP supported IT Labs at the CPCE Outreach Centres in Linden and Rosehall were installed in June/July 2001. The installation at Rosehall is relatively small, with only four computers on a simple peer-to-peer network.

CPCE Linden has supplemented their GEAP resources with computers and printers from other sources, resulting in a client-server network of 10 workstations, built up slowly over the course of one year. Members of the GEAP IT Team, working with the principal and other CPCE staff, performed the initial installation in **June 2001**. At that time, the small number of computers suggested that the network was set up as a peer-to-peer network.

As more and more people made use of the resource, and as more computers were added, problems of network security became apparent. This prompted the change of the network to a client-server model in **September 2001**. This installation was performed by GEAP IT staff with CPCE staff support and included the introduction of secure centrally stored users' folders and simple security polices so that users could not access workstation settings.

Since that time, CPCE Staff have done the more recent work, including the upgrade of the server to Windows 2000.

Both CPCE labs have been used to train student-teachers over the past year. In addition CPCE Linden has also been used by GEAP and LLRC as a resource for occasional training of teachers and community workers.

In addition to the CPCE IT labs GEAP has supported the development of Resource Centres at No. 48 Village and No. 63 Village, Region 6 and at Linden Learning Resource Centre. In all centres, two computers and a printer have been purchased. However, as yet the computers at the No. 48 Village Resource Centre have not been installed, as long-proposed air conditioning and security grilling have not been finished.

2.2 Technical Consultancy Activities

Technical Activities conducted as part of this consultancy included the following:

- Network check of CWSS and TMSS IT Labs (§2.2.1)
- Network check of Linden CPCE IT Lab (§2.2.2)
- Production of network patch and crossover cables to enable simple peer-to-peer networking at the resource centres in No. 63 Village, Linden Learning Resource Centre and the GEAP Linden office (§2.2.2 and §2.2.3)
- Installation of network wall cabling, wall mounted network sockets and patch panel at Linden CPCE IT Lab in order to simplify, rationalise and make the installation more permanent (§2.2.2 and §2.2.3)

2.2.1 GEAP School IT Labs

In September 2001, at the time of the previous technical consultancy, there were many software problems at both of the school IT labs. At the time the reasons for these problems were identified as:

i. **"Technical Issues**. The lack of Network Management Software, together with the need for a great deal of specialist input following incomplete installations made ongoing management more difficult.
ii. **Technical Capacity in Schools**. The lack of experienced IT teachers to act as network managers and/or technicians obviously impacted negatively. This lack of experience by some has caused additional problems when errors have not been dealt with correctly, or not dealt with at all.
iii. **Regular Maintenance**. With little or no regular maintenance by school ITAs or by GEAP small bugs have gone uncorrected. The lack of clear procedures and systems for school ITA to contact GEAP (or other) technical support has worsened the situation, allowing these bugs to develop into severe problems.
iv. **GEAP IT Capacity**. The GEAP IT team has recently halved in number, leaving the two less experienced local staff the responsibility to support the labs. There are plans for more labs, but no more IT staff." (§2.3.4 of previous consultancy report)

Fortunately, all of these major issues have been addressed since last year. Consequently, the reliability of the school IT labs has increased greatly. There have been no closures of either lab for maintenance, and there were no significant problems seen during the network check of this consultancy.

This improvement of reliability would seem to be a result of the following:

i. The installation of **Network Management Software** has made network security more robust, thus ensuring that network users cannot "fiddle" with individual workstation settings or gain access to network files of other users. NMS has minimised the number of network problems, and in some cases, provided simple software tools for the IT Teacher to solve problems.

ii. The **technical capacity in schools** continues to increase, partly as a result of ongoing GEAP training and support by the GEAP IT Team and partly as more teachers attend private IT training. The introduction of the GEAP IT Administraors' Guide has helped schools develop their own maintenance, backup and cleaning schedules.
iii. A restructuring of responsibilities within the GEAP IT Team seems to have resulted in clearer roles and a simpler system for technical support. A regular, proactive **maintenance schedule** has been followed with support visits to the IT labs at least once a month.
iv. GEAP has supported an increase of **GEAP IT Capacity** by funding training courses for members of the GEAP IT Team.

2.2.2 Linden CPCE IT Lab

In September 2001, at the time of the previous consultancy, the network at Linden CPCE was "rebuilt". This was to remedy and counteract problems and difficulties that were occurring with file and workstation security. As reported in the previous report: "Centrally stored, shared folders were set up on a Windows NT server, so that users' documents were available from each and every workstation. Simple security policies were added so that users do not have access to internal workstation settings or to other user's documents." (§4.3.4 of previous consultancy report)

Since that time CPCE Staff have installed Windows 2000 onto the fileserver. Unfortunately, this does not seem to have been completed without errors. An initial network integrity check of Linden CPCE IT Lab showed many problems including:

i. Incorrect network settings on workstations.
ii. The use of more than one domain name across the one small network
iii. Additional redundant services installed on the server
iv. Incorrect IP addressing of the server
v. An attempt to use DNS only across a mixed Windows 2000/98 network. (DHCP and WINS were also installed but not configured correctly.)
vi. Incorrect sharing of one printer through a workstation only, thereby preventing the control of its printer functions by network administrators

It was obvious that many attempts had been made to remedy these problems resulting in the server displaying many conflicting and occasionally incompatible settings. These errors in installation and troubleshooting had produced a network that provided printing and scanning services to users, but did not provide any network sharing of files and allowed access to users' files and workstation control panels. In summary, the network operations were again much as they were before September 2001.

In light of the many and varied number of errors, it was judged that a complete software-rebuild of the server was necessary. (It is often easiest to "wipe the slate clean" and start again, rather than spending a great deal of time trying to untangle a complex knot of problems.) Following a meeting with the CPCE Principal and Staff it was decided that work at CPCE Linden should consist of:

i. Clear IT Lab of hardware and all cabling
ii. Install network cabling, sockets and patch panel
iii. Thorough testing of cabling
iv. Install additional power outlets for the third wall
v. Replace workstations, server, printers and scanner
vi. Network check
vii. Software rebuild of server
viii. Network check
ix. Tidy and make good

Tasks (i) to (vi) were completed within two and a half days. A network check at that time found all workstations communicating with each other over the new cabling, printing and scanning services operating correctly and server operation much as before.

Much time was then spent with the CPCE Principal supporting the removal of items best stored elsewhere and the general tidying up of the lab. Furniture was rearranged and computer benching made good in order to prepare for the delivery of new chairs.

The server rebuild relied on the provision of Windows 2000 CDROM installation disks by a member of the CPCE IT staff. Even though this was arranged it was unfortunately not forthcoming.

2.2.3 Preparing for the Future

As stated in the terms of reference, one of the key IT issues facing GEAP is the installation of new labs at three schools sometime during the next six months. The previous IT consultancy report recommended that the GEAP IT team should undertake this as a way to reduce the complexity and number of problems of the installations at CWSS and TMSS (§2.2).

Over the past two years the GEAP IT team have gained experience of:

- Producing simple technical specifications and ordering computer equipment
- Installing and configuring fileserver operating systems (Windows NT and 2000)
- Installing and configuring Network Management Software (Ranger™)
- Installing and configuring workstations
- Installing software on workstations and servers
- Configuring network hardware and peripherals
- Testing and troubleshooting workstation hardware, network cabling and peripherals
- Troubleshooting server operations

Installing network cabling is perhaps the most obvious omission and it was the development of skills and experience in this area that formed one of the main purposes of this consultancy. Training included:

Day	Topics/Skills Covered
1	Local Area Network Planning – needs, tools, parts, cable, ordering
2	Local Area Network Theory – star topology, hubs, crossover cables Network Cable – types, uses and abuses, noise and crosstalk Wiring schemes – T568A standard, 568A and 568B schemes Production of patch cables and crossover cables Using crossover cables for peer-to-peer networking
3	Network Planning – arrangement, planning for the future, placement of cabling Sockets, keystones and patch panels Wiring of keystones Wiring of patch panels Testing network cabling Horizontal/wall cabling – installing, attaching and testing Assembling sockets and making good
4	Installation and configuration of workstations and peripherals Testing and Troubleshooting

The course materials provide further details of the technical aspects covered during the four days (§ANNEX A).

In Region 6, the production of a crossover cable facilitated the simple peer-to-peer networking of two computers so that files, a printer and the Internet connection can be shared. Unfortunately a recent failure of one monitor did not allow the complete testing of all four computers to take place.

In Linden, a brief check was made of the IT provision at LLRC and the GEAP Offices. Unfortunately recent hardware faults at both locations – one with a monitor and one with a system unit – made additional planned activities for simple peer-to-peer networking impossible.

Working at the CPCE Linden IT Lab the GEAP IT team installed network cabling and components to provide for 15 workstations. By the end of the fourth day all 8 workstations, 3 printers and a scanner had been installed, configured and tested.

2.3 Issues and Recommendations

2.3.1 GEAP School IT Labs and Resource Centres

Both of the GEAP school labs had no serious software problems. Unfortunately, the hardware has not been so reliable. In both locations several components have failed, including CDROM drives, scanner light bulbs and UPS batteries. More seriously three workstation hard drives have failed – two at TMSS and one at CWSS. These are essential if all workstations are to operate and so need urgent replacement.

In addition, the underpowered 5kW 220/110 transformer continues to be in use at CWSS. This was originally intended to be a temporary measure, but was never replaced by the original computer or electrical contractors. Continuing use constitutes a fire and electrical hazard and so immediate replacement is to be recommended.

As mentioned above, recent hardware failures at Resource Centres in both regions have been reported.

In summary:

School or Resource Centre	**Issue**	**Recommended Action**
TMSS	Failure of two hard drives	GEAP to purchase and install
	CMOS Battery in server is exhausted (and has been exhausted since September 2001)	GEAP to replace
	Incorrect installations on 3 workstations	Complete software rebuild of workstations
	Failure of 2 UPS batteries	School to be informed. Labels to be added to workstations informing users of lack of UPS support.
	Failure of 2 CDROM drives	School to be informed (again).
	Incorrect addition of new students with either incorrect username or incorrect home folders	School ITA to be supported with task of adding new students of September 2002
CWSS	5kW Transformer is underpowered, overheating and occasionally sparking!	GEAP to purchase 15kW transformer and arrange installation by qualified electrician.

	One hard drive is displaying error messages	GEAP to purchase. Installation to be performed following failure and testing.
	Scanner bulb is burnt	GEAP to replace
	Server hard drive is nearing capacity	School ITA is to be supported with task of enforcing quotas for users and finding and deleting large files (using Network Management Software).
	Failure of 1 UPS battery	Labels to be added to workstations informing users of lack of UPS support.
No. 63 Village	Monitor failure	Repair or replace
	Faulty monitor only showing green	Repair or replace
	Printer not working correctly for one computer	Peer-to-peer networking to be completed correctly and printer shared.
LLRC	System unit failure	Repair by supplier – item under warranty
	No resource sharing	Produce crossover cable and configure peer-to-peer networking
Bulletwood	Monitor failure	Repair or replace
	No resource sharing	Produce crossover cable and configure peer-to-peer networking

2.3.2 The Linden CPCE IT Lab

The Windows 2000 installation on the fileserver remains the largest technical issue at Linden CPCE IT Lab. Without a complete server rebuild, or a significant number of hours troubleshooting, both by an experienced Windows 2000 network engineer, the fileserver will not provide network services correctly. This will impair network security and make ongoing network administration and maintenance extremely difficult.

Following the network cabling installation there are several minor issues arising:

- The keystone for socket 8 (Workstation 5) seems to be faulty and needs replacement.
- One more keystone and wall cabling is needed to supply socket 1 (not enough keystones were supplied).
- The air-conditioning unit opposite the door has not worked properly since installation last June. GEAP and CPCE need to liase in order to return it for repair or replacement.

Encouragingly, problems noted during the last consultancy have, in the main, been remedied. A review of recommendations from the previous consultancy shows that progress is being made:

Previous Recommendation	**Progress and Further Recommendations**
Additional telephone lines for CPCE and LLRC.	Done
Power cabling is needed for the third wall.	Done
Four or five additional UPS systems are needed	Done, though some type of socket splitters are now needed in order to facilitate the sharing of one UPS by two computers
Chairs need to be ordered and supplied.	Chairs have been ordered and are due for delivery during August 2002.
The benching needs finishing, with wooden boxes being constructed below the benches in order to house the system units, UPSs and cabling.	Benching has been finished, though wooden boxes for system units are probably not now needed, as there are no plans for additional workstations.
Additional storage space needs to be found or	Done

constructed in order to store the additional items from the floor and benches of the IT Lab.	
One or two person/s need to be made responsible for the IT resource and it's maintenance.	Done and due to supplemented soon with the arrival of a Peace-Corps IT specialist from the USA.
Coordination and planning of the use of the lab needs to be carefully timetabled and the resulting schedule needs to be published for all users. Clear guidelines need to be written, agreed and displayed.	Timetable and guidelines are still needed in order to facilitate and support access.
Large number of users and the relative inexperience of any ITA suggest that CPCE needs to consider network management software.	Following the change to Distance Education and the addition of new, experienced ITAs NMS is probably no longer needed.

2.3.3 Preparing for the Future

Judging by the practical results of the training activities, it would seem clear that the team now have the skills necessary to install the cabling for the new IT labs. However, the IT Team is likely to require support from GEAP management in order to take the forthcoming installations through to a successful completion. In particular:

i. **Liaison with project architects.** Close and careful liaison is needed between architects, electrical contractors, builders and the GEAP IT team to ensure that adequate provision is made for the IT installation, including:
   a. Sealing of the room and air-conditioning (the two rooms designated as IT labs do not seem to have any provision for this, even at this late stage).
   b. Electrical and network cabling.
   c. Requesting telephone lines for schools to use for Internet purposes.

ii. **Writing Technical Specifications** for procurement purposes. This support has already been partly provided with the writing of a technical specification as part of the previous IT consultancy. However, this will need revision before any orders are placed to ensure that specifications are current. (A year is a long time in Information Technology.) In addition, the current ITA Network Management Guide will need revision in order to support the newer versions of software, in particular Windows 2000.

iii. **Technical Capacity.** The technical capacity of the GEAP IT team has increased a great deal over the past year, partly as a result of the support given to external staff development activities. As mentioned above (§2.2.1) this has already reaped some rewards with increased network reliability at CWSS and TMSS. Continuing this type of training and certification should be encouraged.

iv. **Communication.** A lack of communication options sometimes prevents simple exchanges of information between the GEAP IT team. A fast response to technical problems requires a simple, reliable communication system – most easily a cell phone that could be made available for member of the GEAP IT team.

3 PLANNING FOR SUSTAINABILITY

3.1 IT In Schools

3.1.1 The Guyana Experience

(For a background to GEAP IT inputs please see section 1.2.)
(This section was written in collaboration with Ms Kim Spencer of the GEAP IT team.)

Computers started to appear in Guyanese Secondary Schools in 1996. Provided by donor agencies and alumni from abroad most of these computers were older (386 processor) machines that were no longer wanted by companies or individuals. A few schools had two or three computers and even fewer were "blessed" with computer labs. As such, these computers were treated with reverence.

The Primary Education Improvement Project (PEIP) came on stream in 1990, and was restructured in 1993. PEIP have equipped several primary schools with IT labs. However, as far as can be ascertained, they have no plans for technical support other than that provided as standard by the supplier. A few staff from each school have attended one week of training prior to the installation but no policies have been put in place to extend or broaden this training in order to develop specialist IT teachers or IT technicians.

The Secondary Schools Reform Project (SSRP) came on stream in 1996. This project focuses mainly on Primary Tops and Community Highs, but does work with one Sixth Form Secondary School (Mackenzie High School) and one Fifth Form Secondary (Annandale Secondary).

SSRP have started to equip their twelve secondary schools with computers. This input has two elements – Computers for Schools (CFS) and School Information Systems (SIS). CFS involves the installation of five additional computers and a printer for use by teachers and students. There are plans to network these computers and provided network cabling for seven more. Some basic training and support will be provided at the time of installation. There are no plans for additional curriculum or pedagogical support.

SIS comprises the installation of one computer in each school for administrative purposes. Educational administration software has been purchased for this purpose and the headteacher, a computer operator and a senior member of staff from each school will receive specialist training and support. This "pilot" project has been significantly extended by the purchase of the software by the MOE and another project for all schools in Region 3 and eight additional schools in Region 4. By the end of 2003 some thirty-two schools will have this specialist software installed. The cost of this input over five years amounts to over 48 million Guyanese dollars, as can be seen below:

Costs	**US$**	**G$**
Initial cost per school	4,000.00	720,000.00
Annual Cost per School	875.00	157,500.00
Cost over 5 years per School	8,375.00	1,507,500.00
Cost over 5 years for 32 schools	268,000.00	48,240,000.00

SSRP plans to support SIS with regional officers based in each of the Regional Education Offices. These officers would have responsibility for the SIS initiative and would provide advisory, but not technical or curricular, support for schools.

The Ministry Of Education to date has no specialist IT staffing. As such, there is little capacity for leading or supporting IT initiatives in education. The Management Information System Unit (MISU) provides some support to SSRP schools and is jointly funded by SSRP and MOE. However, the low level of staffing and lack of relevant IT/education experience force the unit to concentrate on the SSRP SIS input. As such there is no attempt to provide any kind of administrative, curricular or pedagogical support to schools

A new Project BEEMS is due to start soon. This project will be building and refurbishing both Primary and Secondary schools in all of the administrative regions of Guyana. At this stage the precise level of IT input is unknown but will include IT labs for some primary schools (building on the PEIP experience) and school management software, similar to the SSRP SIS for Primary Schools.

3.1.2 The UK Experience

The experience of introducing computers into schools in the UK provides an interesting perspective on the current Guyana and GEAP initiatives. The first computers appeared in UK secondary schools during the **1970s**. These were normally housed in the mathematics departments of schools, and were most often supplied by friends of the school or local universities.

By the **late 1970s** schools had started to buy computers, but only if pressurised by an enthusiastic member of staff with some specialist interest. These computers continued to be seen as the domain of the mathematics and technology teachers – a view strengthened by the adoption of 'O' Level Computer Science by many schools in the **early 1980s**. This course stressed the theoretical aspects of computers and involved much history, programming and computer architecture.

The government together with the national broadcasting network (the BBC) encouraged schools to buy more computers in the **early 1980s** with the introduction of a computer designed specifically for schools, TV programming and finance. In-service teacher-training was also available for a few teachers in each school – often the very mathematics teachers that had been using computers for years and were now teaching Computer Science. The increase in the number of computers and experienced teachers increased the variety of uses that computers were used for. Even though specialist school software was not available computers were put to use for administrative purposes – often processing examination entries and printing letters.

As business expanded its use of computers so business subjects in schools had to adopt the new technology in the **mid to late 1980s**. Improvements in computer speed and new applications like desktop-publishing made computers more attractive to other subjects as tools for student learning and lesson preparation. As computers were used in more subject areas and more schools, a market for educational software was created resulting in computer aided learning packages for all abilities. The 1988 National Curriculum introduced for the first time the requirement for all subject areas to make use of Information Technology.

The **late 1980s and early 1990s** saw computer power increase a great deal, with little increase in price. The increased power allowed manufacturers to create more user-friendly, graphically-rich interfaces – features that appealed to potential customers in homes and schools across the UK. The studying of Computer Studies declined as school students made use of computers for their studies rather than study how they worked or how they were programmed. Computers were no longer just for geeks or nerds.

The increase in popularity increased demand for computers in schools. Computer networks were installed as a way to decrease costs and more effectively manage the expensive resource. The growth of The Internet in the **mid 1990s** fuelled demand even further and forced government spending on Internet access

and equipment. The first IT teacher-training programme designed for all in-service teachers started in the **late 1990s** and concentrates on the use of IT within different subject areas.

Currently this emphasis on computer as a teaching and learning tool remains. "Information Technology" as a subject in its own right exists, but concentrates on the use of IT for business and industry. Pre-vocational IT short courses are popular, giving secondary students and adults the chance to gain specific skills for employment. Theoretical computer science tends to be studied only at Advanced Level and beyond – at secondary level only a few topics are delivered as part of IT, mathematics or technology courses.

3.1.3 The GEAP Experience

Currently both GEAP IT labs are being used in the following ways:

Teaching Students.

IT as a discrete subject is being taught in both schools at two levels. All students in Forms 3, 4 and 5 receive basic IT lessons, concentrating on introducing and improving IT skills. Both schools are also phasing in CSEC IT, allowing a few students to sit the CXC examination in 2003.

IT teaching methodology remains largely traditionally didactic with emphasis on learning knowledge, not necessarily applying skills. This matches the style of more academic CXC examination qualifications, but does not necessarily prepare students for IT-related work. However, the motivation to introduce CXC is easily understood – CXC IT is the only nationally recognised qualification!

The introduction of CXC also has the disadvantage of reducing access to the IT lab for other, non-CXC, students. Both labs have few periods free each week for use by other subjects or other students. This could be alleviated with more flexible timetabling; perhaps making use of after-school or lunch periods.

Supporting Other Subjects

A recent survey of staff found that 75% of teachers at CWSS saw computers as having some potential educational benefit for their classes. Educational research reinforces this position with IT being found to have positive effects on student motivation, independent learning and research skills, particularly at a CXC level.

However, only 16% of teachers have made use of the IT lab for teaching – for classes in science, technology, mathematics and art. The reasons for this seem unclear, with the only consensus being that more training is needed to help teachers use the IT lab for teaching – 43% of teachers stated that they lacked confidence with the computers and 48% did not feel that they had enough knowledge of IT applications as a teaching resource.

Preparing Teaching/Learning Resources and School Administration

The use of the computers to support teachers can be judged to be the success story of the GEAP IT labs. One third of the CWSS staff use the computers as research tools; over one half use them to produce test papers; two-thirds have made us of printed materials produced in the IT lab. 73% of the staff agree that the lab is available to all staff and 70% state that there is support when they need it.

The IT labs have also supported the administrative and clerical work in the schools. Though no specialist School Administration Software was provided by GEAP, schools have made good use of standard applications in order to produce letters, invites, attendance records and timetables in large numbers. Teachers and clerical staff are using spreadsheets and databases to record, analyse and present information for use by themselves and the school.

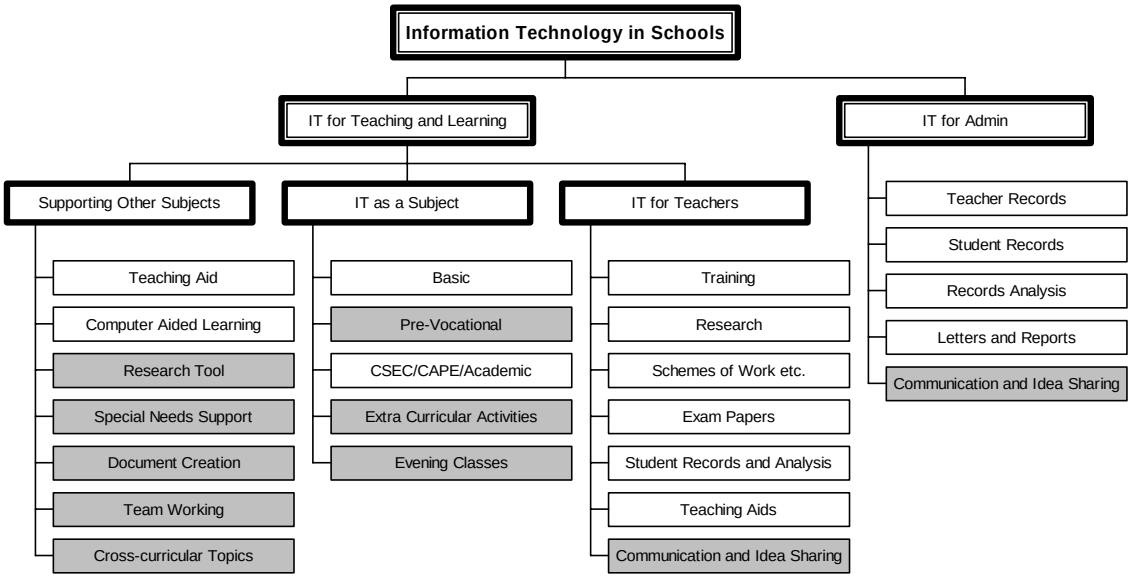
It is unfortunate then computer-processed information is often not acceptable for MOE and/or Regional Education Office purposes because it is not on the correct size of paper or is not handwritten. It is also unfortunate that the Internet is not being used to speed up communication and share ideas between teachers, schools and Regional Education Offices, even when it is available to all concerned. This would suggest that current paper-based information and communication systems might need to be adapted or revised, if schools administrative software is to significantly improve efficiency and effectiveness.

Teacher Training.

Initially GEAP made intensive use of both labs to train all the teachers in both schools. More recently this training has not been needed, but both schools have continued with informal in-service training for new staff and for staff that request support.

3.1.4 Comparing Experiences

Experience from other countries, including that of the UK, suggests the following potential uses of computers in schools. (Areas that the GEAP schools are not making use of are highlighted in grey.)



3.2 Technical Support

Since the installation of the GEAP IT labs the project IT staff have provided the technical support to CWSS, TMSS, the CPCE centres and Resource Centres. Until July 2001 staff based in the two project regions provided support as needed. Since September 2001 one member of the GEAP IT team has taken responsibility for technical support. Based in Region 6, visits to all labs are scheduled at least once a month.

In addition, and if requested, GEAP IT staff has also provided support for non-GEAP computers and IT staff in the project regions, Georgetown and further afield. The need for this support continues to grow, with GEAP staff often receiving requests for help from schools, Regional Education Offices, CPCE and Resource Centres.

The Project IT team have reduced the need for technical support by installing specialist Network Management Software onto GEAP school networks. This simplifies many routine tasks; stops users

changing system settings; and implements network security for users' documents. This software has cut IT teacher workload and errors and has significantly reduced the number of technical support callouts.

However, no software can entirely eliminate the need for technical support. Over the course of two years the GEAP IT labs have suffered many hardware and software problems. Many of these have been non-fatal errors, but some have caused workstations to fail completely and one or two have caused entire network failures. The GEAP experience has shown that a lack of Network Management Software and regular maintenance produces an unusable IT lab within a few months. Even with specialist software it is unlikely that a school IT lab "survives" longer than a year if no technical support procedures are in place.

It is clear that the need for technical support will continue. However, GEAP capacity for this is currently limited and is due to disappear completely by December 2003. MISU would seem to be the obvious successor, but only if its focus, staffing and location can be broadened to cover all aspects of school IT support in all regions.

3.3 Resource Management

3.3.1 Background

The introduction of any new resource into a secondary school always requires careful management, particularly if it brings with it a new curriculum area and/or new staffing. The introduction of computers into Guyanese schools is likely to be even more difficult because of the following reasons:

- **Computers are new** to schools in Guyana and as such, experience of policies and procedures for their management and use do not exist.
- **Computers are useful**. Unlike most other resources in schools computers are not restricted to one curricular or administrative area. They can be used as a teaching resource for CXC IT, but also as a teaching and learning tool for other subjects, or as a administrative tool for student records, or as a document creation tool for examination papers…
- **Computers are expensive** and so any mistakes made with their introduction, maintenance or use could impact heavily on school finances.

Partly because of these reasons, computers seem to be seen as the "magic bullet" to solve all problems. Expectations of computers are high. Therefore, there is added pressure on schools with IT labs to manage their computers well and deliver results. Any problems are unlikely to go unnoticed or be forgotten.

Unfortunately, the GEAP experience suggests that there will be problems. For the reasons outlined above, these issues are presented below not as IT problems, but as problems that IT seems to bring more sharply into focus for schools and the Ministry of Education.

3.3.2 Issues

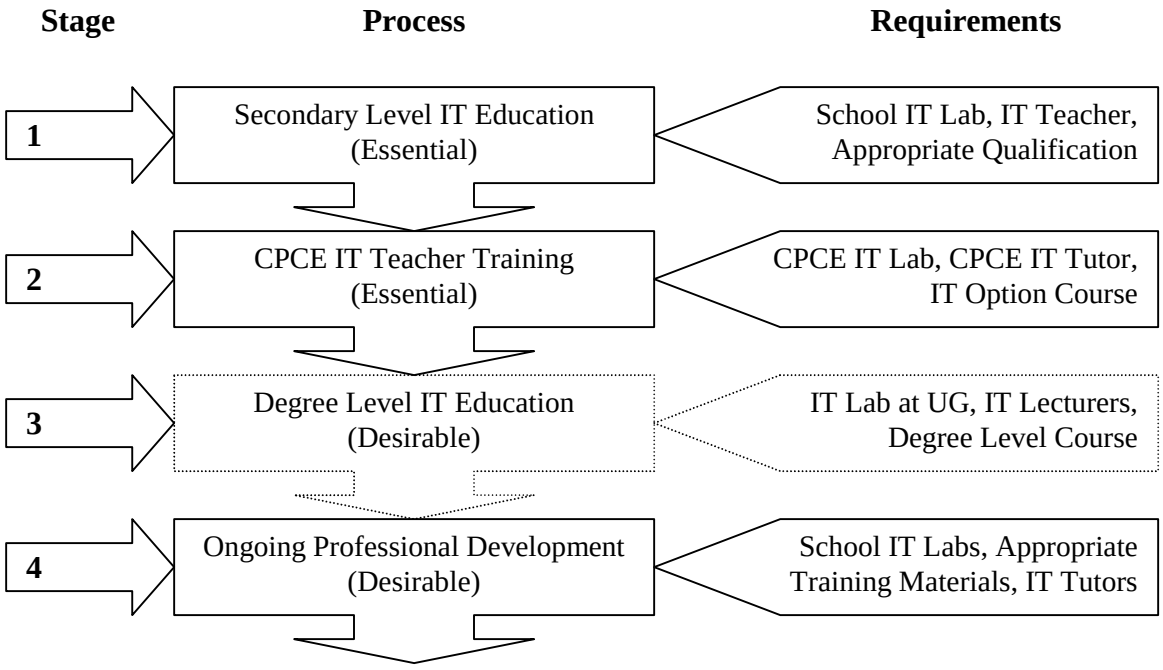
- **Aims and Purposes**. Without guidance from the MOE it is difficult for schools to decide upon clear rationale and purposes for their IT lab. However, unless these are clarified any further plans are made all the more difficult.
- **Access**. As stated above expectations of computers are high and demand for their use is likely to match these expectations. Unfortunately this demand easily outstrips supply and so schools have to make uncomfortable decisions as to access. With clear purposes this process should be simplified. For example, if CXC IT is the schools' aim then it is obvious that the Form 4 and 5 groups will have priority.
- **Timetabling**. For access to the IT lab to be maximised there needs to be a well constructed and managed timetable across the entire school. A timetable for only the IT lab is a useful first step,

but unless it is synchronised with a whole-school timetable (and both are followed by teachers) it is unlikely that the IT resource will be used efficiently.

- **Management**. The responsibility for the IT lab, as with the rest of the school, is clearly with the headteacher. However, it is unlikely that they will be best placed to supervise the resource from day to day. If access is a priority for the school, this supervision requires an experienced, relatively senior, IT-literate person to be often present in the lab.
- **Training.** If the school sees one of the purposes of the IT lab as a tool for teachers then it is likely that some form of in-service training will be necessary. However, there are no IT INSET training packages from NCERD/MOE available to schools.
- **Low-level Technical Support.** Even with external technical support systems the school is still likely to need a person on the staff that can help teachers and students with enquiries, solve simple hardware/software problems and identify more complicated issues for onward referral.
- **Guidelines**. Students, teachers and others will want to make use of the IT lab. Guidelines need to be written to ensure that their use does not decrease the lifetime of the equipment or restrict access. A lack of guidelines can lead to a misuse or abuse of the IT equipment or Internet access.
- **Cost of Consumables**. If the lab is being well used, ink and paper will also be used. These will have to be replaced if the use of the lab is to be sustainable. Clear, simple, enforceable systems need to be in place in order to pay for, and replace, these consumables.
- **Cost of Maintenance, Upgrades and Replacement.** A capital cost of approximately $25000 is needed for a GEAP lab of 14 workstations. The lifetime of a computer lab is approximately five years. Therefore, the replacement costs equates to approximately $5000 per year.

3.4 Teacher Training and Supply

The route to becoming an IT teacher should ideally be as follows:



Unfortunately, a low capacity for IT within the education system of Guyana hinders this process at all stages:

- **Stage 1**. Few schools have IT labs and/or IT Teachers and so few students are leaving school with any experience of IT. Students that do enter CPCE with any IT experience tend to have acquired this through study at private schools or work in industry, business or the Defence Force.
- **Stage 2**. CPCE Turkeyen has two IT labs – one recently provided by SSRP and one supported heavily over the past few years by the efforts of VSO and a VSO volunteer. CPCE centres at Linden and Rosehall also have small IT labs with the equipment provided primarily with GEAP funding. CPCE courses are currently changing to a DE format and all new students will now have to follow a basic IT course. Previously, all students studied a basic IT course and primary students could opt to take the specialist IT option course. A new IT Option course for secondary students is currently in development.
- **Stage 3**. The IT facilities at UG have recently been improved, as has the undergraduate course programme, following the placement of a VSO Volunteer as the Head of the IT Department over the past few years.
- **Stage 4**. The number of schools with IT labs is slowly increasing and so, in theory, there should be enough IT Teaching jobs for the newly trained IT teachers. However, longer-term retention of IT teachers seems difficult with many leaving to work in the private sector or overseas. There are few opportunities for ongoing professional development and the pay structure does not provide enhancements for IT teachers or teachers that have followed additional training. Therefore the demand for IT teachers has not been met by CPCE.

GEAP has developed and piloted a IT teacher retraining course in both regions over the past three years. Designed to supply the increasing demand for IT teachers GEAP asked schools to identify teachers that had an interest in, or some experience of, IT in 1999. These teachers have attended training sessions since then in order to prepare them to teach IT up to a CXC level, support colleagues in schools with technical issues and train other teachers to a basic level.

This training is now in its final year, with approximately fifteen teachers due to “graduate” in July 2003. Training is now at a relatively high level, with specialists from UG and CPCE supporting the GEAP IT team with the delivery of some topics. However, at this stage there remains no CPCE or UG accreditation for this training and so the future status of these teachers is unclear.

3.5 Web Site Development

3.5.1 Background

The geographical nature, sparse population and lack of access to information for many would suggest that the Internet could be extremely important in Guyana’s development. For the education sector use of communication technologies could support teaching, learning and school management at many levels. For example:

- Students could access research information from the World-Wide-Web, exchanging their ideas with students from other countries.
- Teachers could download lesson-plans and teaching/learning resources from a NCERD web site and email suggestions for new activities and curriculum revisions.
- Regional Education Departments could monitor school records more closely using email communication or a web-based database.

However, the development of web sites seems to be slow, probably due to the lack of expert knowledge, the relatively few Internet Service Providers and the poor telephone infrastructure.

GEAP developed a web site in late 1999 (www.geap.org.gy). Initially containing some just contact details and small amounts of information, this has expanded over time into a resource for educators and others interested in the project.

3.5.2 Consultancy Activities

Consultancy activities included the revision of the GEAP web site to include new sections and improve usability. The updated web site now has the following parts:

- **Information**. Includes background information about the project, project area regions, Education Access Fund, infrastructure and IT inputs.
- **News**. Includes a current news section together with a news archive of GEAP activities back to early 1999.
- **Knowledge Bank**. Contains copies of all consultancy reports and some project planning documentation for users to download and view.
- **Sister Sites**. Provides links to:
  - *School Web Pages.* All secondary, and some primary schools, in the GEAP regions have produced their own web pages. The URL addresses for these all start www.geap.org.gy/schools/ and then continue with the school's initials. For example:
    - Mackenzie High School – www.geap.org.gy/schools/mhs/
    - One Mile Primary School – www.geap.org.gy/schools/omps/
  - *Hosted Sites.* GEAP has supported four education organisations (NCERD, LTI, PATH and FREED) with the production and hosting of their own web sites. Of these NCERD is the most comprehensive with links, teaching resources and curriculum documents to download and view. (NCERD can be viewed at www.geap.org.gy/ncerd)
  - *Other organisations.* GEAP has obvious connections with the MOE, CFBT, DFID, SDNP etc. Contact details and web addresses for these and other organisations can be found here.
- **Contacts**. Provides information about the GEAP staff and contact details for the GEAP offices.

The sustainability of the GEAP web site would not seem to be an obvious issue. The end-of-project date is the end of 2003, so it is likely that the web site should go offline at the same time. However, with the current hosting arrangements this would also mean that other web sites would also go offline, including NCERD and those of many schools.

3.6 Recommendations

Clear leadership is needed from the MOE, MISU and/or NCERD with respect to several IT issues:

- **Educational Aims for IT Labs**. Schools remain unclear as to the exact educational purpose of the IT equipment installed. Different methodologies need to be trialled and evaluated in schools before possible replication. GEAP should support this process by advising schools and Regional Departments of Education with regards to possible ICT teaching, including:
  - Cross-curricular teaching and learning.
  - IT for special needs or "remedial" students.
  - IT for Post-14 and Post-16 pre-vocational studies.
  - Use of communication technologies to facilitate collaborative learning with other schools and other countries.
- **Management Principles and Procedures for IT labs**. GEAP needs to support this process by sharing good management practice from the GEAP IT labs – perhaps in the form of a School's Guide to IT Labs or an in-service training pack for schools that are installing labs.
- **IT Curriculum Content.** The GEAP IT Team, together with IT staff from the two schools, should support this process by continuing work on curriculum development both for NCERD's National Curriculum revisions as well as the Alternative Learning Pathways Initiative.

- **IT/Education Budget.** IT budgetary needs of schools must be addressed, if IT labs are to remain working. Additional consultancy input is needed in order to fully evaluate the cost implications of IT labs in schools. Such a consultancy must include analysis of possible hardware/software choices including the use of "Thin-Client" hardware and/or "Open-Source" software. (§ANNEX C for further details.) In addition, careful consideration needs to be given to the provision of School Administration Software, taking into account compatibility, technical support and training requirements as well as cost.
- **Technical Support Systems**. An in-depth study of possible support systems is needed and should include, as a minimum requirement:
    - Providing support for current and planned IT provision.
    - Staffing and pay structures, including MISU and education staff in schools and Regional Education Offices.
    - The role of private-public partnerships.
    - Training requirements.
    - Communication and networking systems, including the use of remote access for computer administration.
    - Methods of reducing the need for Technical Support by using Network Management Software or other Management Software.
    - Operations Research into the costs and benefits of proactive regular maintenance and more reactive callout strategies.
    - Resourcing, cost and sustainability.
- **The Role of the school ITA**. This needs to be accepted, clarified and resourced by the MOE and TSC. (§ANNEX B for further details.) In order to support the teacher-training aspect of the ITA's role GEAP should review their in-service training materials and then revise them for use in other schools and to share with NCERD, MOE etc.
- **CPCE Teacher Training**. A CPCE IT Option course for secondary teachers needs to be introduced as soon as possible. This should be supported as much as possible by GEAP and/or additional consultancy input. As a first step GEAP should share their IT teacher-training materials with CPCE to support the writing of the new course.
- **Other Teacher Training.** Additional methods of sourcing IT teachers are needed – perhaps by the accreditation of private training certificates or by retraining current teachers. To support this the ongoing investigation into the accreditation of the GEAP IT Teacher-Retraining course should be continued. Plans for the ongoing sustainability of this course also need to be investigated – perhaps by initially allowing local CPCE centres to access GEAP funding.
- **Teacher Retention**. The issue of teacher retention, particularly of IT teachers, needs to be accepted and addressed by the MOE and TSC. Similar issues of recruitment and retention of staff at Higher Education levels also need to be addressed, if the long-term use of VSO IT specialists is to finish.
- **Web Site Development**. Liaison needs to take place between GEAP, NCERD, MISU and SDNP in order to facilitate the review of current web site provision. This review needs to clarify responsibilities in order to minimise unnecessary duplication of effort and to agree purposes so that any further development of web sites for NCERD, MOE etc. will maximise user access to locally produced, relevant resources.

GEAP needs to address several issues in order to capitalise and build on previous IT achievements over the final year of the project:

- The GEAP IT Team need to revise the ITA Network Management Guide in order to accommodate updates and changes (e.g. Windows NT to Windows 2000 etc.)
- GEAP IT Teacher-Retraining needs to target CXC topics of Pascal Programming and Database Management.

ANNEX A – NETWORK CABLING GUIDE

ETHERNET/CATEGORY 5 NETWORK

CABLING GUIDE

Prepared by SJ Wilkinson (August 2002)
Based on Steve DeRose's Guide to CAT5 Network Wiring (See later Web Reference)

DUE TO ITS LENGTH, THE CABLING GUIDE
IS NOT INCLUDED HERE – A COPY HAS BEEN FORWARDED TO MOE'S MIS UNIT AND TO EACH REGIONAL OFFICE WHERE GEAP IS OPERATIONAL. SHOULD ANYONE WISH TO OBTAIN A COPY, PLEASE CONTACT MoE or GEAP.

ANNEX B – THE ROLE OF THE ITA

(Originally produced for the Region 10 IT/Education Conference – June 2001)

SSRP/MISU has been using the term IT Administrator (ITA) for some time to denote a teacher that has some responsibility for the school's (administrative) computer equipment. GEAP has taken the terminology and attempted to develop a fuller job description, based on the experiences gained from monitoring the use and management of two computer labs in Regions 6 and 10.

GEAP sees the role of the ITA as a specialist, senior teacher that can:

- Administer the computer network and provide technical support.
- Lead the IT department and teach IT to at least CXC level.
- Support the use of IT by colleagues with appropriate staff-development activities.
- Identify and train Deputy ITAs (to counteract possible migration etc.).
- Work with the IT department, admin team and Headteacher to take joint responsibility for the management of IT.

Currently there are two or three middle management positions in schools – the SAM, the SM and the HOD. Of these only the HOD and the SM have clear responsibilities written into the MOE Desk Manuals for schools.

SMs have responsibility for

- Accommodation, cleaning and ancillary staff
- Discipline and supporting teachers
- Guidance and counselling
- Assembly rota
- Distribution and checking of student registers
- Monitoring of students' work
- Teacher punctuality and cover
- Supporting DHM with appraisal procedures
- Feedback to HM and DHM re. their area or section
- Monitor meeting structure and ad hoc meeting groups
- Internal exams
- Administration of external exams
- Administration for events

HoDs are responsible for:

- Departmental improvement planning
- Staff appraisal
- Writing and reviewing schemes of work, delegating areas of scheme to other members of department as necessary
- Internal exams
- Monitor teaching and learning, making use of test results as necessary
- Workshops re. methodology for department as necessary
- Inventory and use of departmental resources, ordering equipment and use of specialist room/s
- Liaison between admin meetings and department
- Liaison with HM/DHM re. timetabling
- Promoting inter-departmental work
- Chairing departmental meetings
- Ensuring staff are aware of admin procedures

Clearly then the suggested role of the ITA does not easily fit into either of these structures. While it is true that the ITA must act as the HOD for IT, it is also true that they must take a wider role – supporting the development of IT across all departments. This would suggest that some restructuring needs to take place in order to fully accommodate this new role and this new subject.

ANNEX C – WINTEL VS. OPEN-SOURCE

The GEAP labs, together with most other IT labs in education institutions in Guyana, are based on Intel technology and Microsoft Windows and Microsoft Office software (commonly referred to as "Wintel"). The decision to install this type of computer was informed by the MOE/MISU guidelines and took account of the minimal local expertise with any other type of hardware/software combination. However, this is a relatively expensive choice.

Open-source software is gaining popularity in many parts of the world, particularly in areas where financial resources are limited. Open-source software is quality software, produced by groups of individuals from around the world. It is freely available to use, often easily downloaded from the Internet. "Open-Source" refers to the fact that the programming code is also normally available for viewing and improving – if you have the inclination and the skill!

The cost implications of the hardware/software choices are considerable, even when you consider just one workstation:

Option 1: Up-to-date Hardware and Microsoft Software

Hardware	$1221*
Microsoft Windows 98, Microsoft Office 2000	$210
Microsoft Windows NT (License cost shared across 20 workstation network)	$1690/20=$84.50
Total:	**$1515.50**

*Price paid for workstations from Guyanese IT retailer

Option 2: Up-to-date Hardware and Open-Source Software

Hardware	$1221*
Red Hat Linux, Sun StarOffice 6.0	0
License for network operating system not needed as Linux Server software is also free	0
Total:	**$1221.00**

Option 3: Reconditioned Hardware and Open-Source Software

Older, reconditioned computers are available from several charities for minimal cost ($29 and $39 are typical prices) and shipping costs. These computers are often only two or three years old and can be used effectively for most school work, particularly if smaller harddrives and memory modules are replaced with larger, more modern units.

Hardware	$100
Additional Harddrive and RAM	$150
Red Hat Linux, Sun StarOffice 6.0	0
Total:	**$250**

A network of reconditioned workstations with one up-to-date, high-specification computer to act as a server will provide an extremely cost-effective solution that works just as well as a Wintel network (and is likely to be more stable and so require less maintenance). Many schools in the USA, Southern Africa and Europe are making use of this lower-cost alternative. (See http://k12linux.org for more details.)