ITEM FOR FINANCE COMMITTEE

**HEAD 177 - SUBVENTIONS : NON-DEPARTMENTAL PUBLIC
                      BODIES**
Subhead 871 Vocational Training Council
**New Item "Enhancement of information technology infrastructure and
services"**

> Members are invited to approve the creation of a new commitment of $176.9 million for the Vocational Training Council to enhance its information technology infrastructure and services.

PROBLEM

The existing information technology (IT) facilities and applications of the Vocational Training Council (VTC) are inadequate to meet the modern day needs of vocational education. Its management also requires the support of a more comprehensive and sophisticated Management Information System (MIS).

PROPOSAL

2.   The Secretary for Education and Manpower proposes to create a new commitment of $176.9 million under Head 177 Subventions : Non-departmental Public Bodies to enhance the IT infrastructure and services of the VTC.

JUSTIFICATION

3.   In today's information age, the use of IT has become an indispensable tool in education to facilitate both teaching and learning. For the basic education sector, the Government issued a strategy document entitled "Information Technology for Learning in a New Era: Five-year Strategy 1998/99

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to 2002/03" in November 1998. A capital sum of $3.2 billion and a recurrent sum of $590 million were allocated for implementing the various initiatives. These initiatives include enhancing our students' access to IT and the Internet. All schools have been provided with cash grants to purchase computers and connect them to the Internet. We are also providing more support to teachers including enhanced training in IT. In addition, the Education Department has set up an Information Technology Education Resource Centre which runs a software library with education software for teachers' preview. As a step further, we are considering setting up an education-specific intranet which will, amongst others, provide more educational resources to teachers.

4.   For the tertiary education sector, individual institutions have also allocated substantial funds to upgrade their IT infrastructure and services. For instance, Internet is now widely used for various teaching activities, including on-line learning, tutoring, disbursement of course notes, location of course materials and collection of assignments. Free e-mail accounts and off-campus dial-up links are provided to every student of University Grants Committee-funded institutions. For some institutions, all the classrooms are now networked. These initiatives have enabled students to access on-line teaching materials and the Internet conveniently and have helped create a fully IT-enabled learning environment.

5.   For the same reasons, the existing IT infrastructure in the VTC requires substantial upgrading. The present IT facilities in the VTC are deficient in a number of respects. For example, not all student personal computers (PCs) on campus could access the Internet. Personal e-mail accounts and off-campus dial-up links are not provided to students. The facilities do not allow the wide use of Internet for various on-line teaching and learning activities, like on-line assignment submission and on-line dissemination of course materials. There is therefore an urgent need for the VTC to upgrade its IT infrastructure and services to create an IT-enabled teaching and learning environment. This will facilitate self-learning by students and the acquisition of essential IT skills to enhance their employability. The proposed improvements, as set out in paragraphs 6 to 14 below, are necessary to enable the VTC to better fulfil Hong Kong's needs in IT-enabled education.

(i) Use of IT for quality vocational education

6.   Similar to other streams of education, the trend of vocational education is to make a fuller and wider use of IT to assist both teaching and learning. Students are expected to use IT as a medium of self-learning and will have to acquire a high level of IT skills before they enter the job market. The teaching process is also changing from one of teacher-oriented to student-oriented through a more independent, self-paced and multi-media mode of learning.

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7.   In view of these developments, the VTC plans to deliver teaching and learning materials on the Internet/intranet in a lively and interactive manner (web-based teaching) so that students can access them at any time during the day and outside the campus. They will enable students to learn at their own pace to suit their individual learning needs. The VTC also intends to provide teaching staff with additional tools to enrich the teaching process by encouraging more frequent use of multi-media equipment, and to provide students with ample opportunities to use computers and access the Internet.

8.   However, these initiatives cannot readily be supported by the VTC's existing IT infrastructure. Multi-media equipment, for instance, is available only in a limited number of lecture halls and classrooms. Connectivity to the Internet is available only on a limited basis. Moreover, advanced technologies to enable web-based teaching is beyond the capability of the existing IT system.

9.   To take advantage of IT in the delivery of vocational education, these shortcomings must be addressed. The VTC, therefore, proposes to -

(a)   launch a web-based teaching and learning service by installing the necessary systems so that students can access teaching materials at any time and outside campus;[1]

(b)   install an additional 1 200 PCs (including 800 multimedia PCs and 400 notebook PCs) and necessary supporting equipment, such as PC servers and printers in classrooms, lecture halls, and common areas of the VTC campuses to increase students' access to computers.[2] The aim is to facilitate the use of IT in the teaching and learning process;

(c)   connect all PCs to campus networks to provide students at all levels with wider access to the Internet and remote access to the VTC's network;

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[1]   VTC plans to design and provide multi-media course contents for 75% of the total curriculum in five years' time.

[2]   Of the 1 200 PCs, 300 will be installed in existing as well as four new computer rooms. Another 450 PCs will be installed in classrooms and lecture halls of the VTC's nine vocational education campuses to ensure that each classroom/lecture hall will have at least one PC. The other 450 PCs will be installed in common areas (such as libraries, reading room) of the VTC's vocational education campuses and training centres.

(d)   further enhance the existing Dynix Library System with new services like reserved collection and self-check circulation, and to expand the electronic library system to allow on-line access to more journals/video databases to facilitate teaching and learning;

(e)   install video-conferencing facilities so that one lecturer can address more than one class at one time. This will enable the VTC to optimise the use of its limited space;

(f)   provide facilities to enable students to access their academic and personal information pertinent to their studies;

(g)   launch a virtual help desk service which will enable end-users such as teachers, students and staff to access IT related help services;[3]

(h)   install a time-tabling system to optimise the use of physical resources to support the teaching and learning process and to improve course provision; and

(i)   replace outmoded IT facilities to enable modern software to be run and to improve the level of services provided.

(ii) MIS and user services enhancement

10.   The VTC first adopted the application systems on student admission, accounting and payroll functions developed by the then Hong Kong City Polytechnic in 1986. The existing MIS provides basic administrative and management functions such as finance, student administration, basic personnel and leave record, course information and planning. However, there is no linkage between different databases. The analytical functions of these databases also fall short of the needs for comprehensive and sophisticated analysis of the data now required by different levels of management within the VTC.[4] The MIS

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[3]   The help desk service will cover, for example, solutions on commonly encountered problems in using common software packages.

[4]   For Members' background, both the City University of Hong Kong and the Hong Kong Polytechnic University have an integrated MIS with comprehensive analytical functions, like human resources management, resources inventory and analysis of cross-functional data. A number of these functions, which are crucial for efficient management and operation of an education institution, are not available in the existing MIS of the VTC.

enhancements proposed in this submission are intended to support new initiatives aiming at providing more efficient and cost-effective services to an enlarged group of end-users with an ultimate goal of facilitating the decision-making process and enhancing the quality of teaching and learning activities. For instance, the proposed enhancement will facilitate planning of new courses which requires cross-functional analysis involving student and staff profile, finance and resources information. Teaching staff could also easily keep track of students' academic progress and provide appropriate counseling to the needed.

11. The VTC's current MIS does not provide information for human resource management and resource inventories. This has hindered the management of the VTC in optimising its use of resources. The availability of these functions will enable the VTC to rationalise the use and allocation of its resources. For example, with the human resources management system, information like staff development needs and staff appraisal would be available to facilitate staff planning. The current system is also unable to cope with new operating requirements such as those arising from implementation of the Mandatory Provident Fund (MPF).

12. Furthermore, there is limited accessibility for frontline users (other than operational staff) like teaching staff performing on-line student assessments. This has inhibited the efficiency of information dissemination. The web-based deployment of IT facilities as opposed to the existing window-based interface will be the best solution to enhance information dissemination.

13. To reinforce its management capabilities in terms of strategic planning, decision making, resource allocation and co-ordination of activities, the VTC proposes to -

  (a) integrate all of its individual databases into a coherent system with full compatibility and to make available to management the information it requires to satisfy management needs. Analytical functions will also be enhanced by providing cross-functional data analysis facilities to give the best possible support to management planning;

  (b) develop/acquire various application systems, including human resource management and resource inventories to strengthen its management capabilities, and minor maintenance, repairs and improvement works and MPF function to meet operation needs;

(c) upgrade the interface of its MIS to enable deployment in a web-based environment. This will enhance the user-friendliness and accessibility of the MIS substantially. This will also lower client software unit cost and reduce training and support requirements;

(d) provide facilities to ease and speed up information exchange between the VTC and government bureaux, universities and the industry; and

(e) enhance the hardware of its MIS to accommodate the improvements described above.

(iii) Network infrastructure enhancement

14.　　　　To extend the use of IT in the delivery of vocational education and to support the above improvements of the MIS, the VTC will need to enhance its network infrastructure. This involves -

(a) expanding the current campus network and upgrading the linkage between the VTC's campuses to facilitate new applications and services such as video conferencing and web-based teaching;

(b) upgrading its Internet facilities, servers and some of its desktop computers to provide a better service and increase the connectivity within the VTC and to policy bureaux, government departments and external bodies such as universities and other educational/training providers; and

(c) reinforcing the security of its network to facilitate remote access and transmission of information to and from the VTC.

Cost and Benefit Analysis

15.　　　　The proposed enhancements relating to the use of IT for quality vocational education and the network infrastructure will deliver the following benefits -

(a) the use of IT as a medium of teaching and learning will improve course provision by enabling a move from teacher-oriented activities to student-oriented activities;

/(b) .....

(b)   the use of IT will improve cost efficiency by increasing the student through-put. This will be brought about through an improvement to the quality of course provision by providing a modern, interesting and interactive learning environment, which will enhance teaching and learning effectiveness. As a result, students will be able to better assimilate course materials and experience a richer, more interesting and interactive learning environment;

(c)   the quality of education will be improved by enabling students to access teaching materials 24 hours a day. Students can get on-line assistance any time from course abstracts/teaching packages;

(d)   the Internet and e-mail facilities will be expanded for use by students at all levels;

(e)   the additional PCs will save students' time by extending computer service points to classrooms, library and students reading rooms, etc. It will also allow more advanced teaching and learning software to be installed for use by both students and teaching staff;

(f)   the flexibility of video-conferencing teaching will in future save costs on the building of large lecture halls;

(g)   enhanced IT services will cultivate an IT culture for both students and staff for life-long learning; and

(h)   IT will improve ties and communication with the industry, universities, other educational/training providers, government bureaux and departments, thereby encouraging fruitful academic exchanges and improving administrative efficiency.

16.   The proposed MIS enhancement will provide more efficient and better quality services. Most of the enhancements are new services and cost savings are difficult to quantify. Nevertheless, the VTC estimates that an annual cost saving of $7 million[5] will be achieved upon full implementation of the proposed MIS enhancement. The enhancement will also provide the following benefits -

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5   The $7 million annual savings projected by the VTC comprise $5.4 million savings in temporary clerical/support staff costs and overtime payments and $1.6 million savings in operating expenses. These savings will be returned to the Government through reduction in VTC's recurrent subvention.

(a) an enhanced MIS for all teaching, administrative and management staff will increase their efficiency and provide them with the needed management information in a timely manner for decision making. This will lead to improved planning capabilities and a more efficient use of resources;

(b) web-based applications require less development time, reduce training and support requirements and can be made available on local campus networks, Council-wide area network, intranet, or the World Wide Web;

(c) an Executive Information System will enable analysis of cross-functional data that is not possible on existing uni-functional systems;

(d) the use of IT will reduce the time lecturers have to spend on administrative tasks enabling them to devote time to teaching activities, e.g. giving guidance to students, development of IT-enabled curricula, and self-development;

(e) storing data in common data repository simplifies data security strategy. Security policy can be formulated more clearly and procedures be followed more easily; and

(f) enhanced information exchange between the VTC and government bureaux, universities and the industry will lead to significant gain in operation efficiency and better designed courses matching the needs of local labour market.

Implmentation Plan

17.   The VTC plans to implement the proposal in phases from 2000-01 onwards for completion by 2003-04. A phased implementation plan is at Encl. 1   Enclosure 1, the progress of which will be closely monitored and managed by the VTC's IT Steering Committee[6].

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[6]   The Committee comprises Deputy Executive Director (Academic) and a team of ten senior staff of the VTC.

FINANCIAL IMPLICATIONS

(i) Non-recurrent expenditure

18.　　　　We estimate that the proposal will incur a non-recurrent expenditure of $176.9 million, broken down as follows -

		2000-01 $ million	2001-02 $ million	2002-03 $ million	2003-04 $ million	Total $ million
(a)	Use of IT for quality vocational education	18.9	32.4	38.1	0	89.4
(b)	MIS and user services enhancement	8.9	31.9	18.2	2.0	61.0
(c)	Network infrastructure enhancement	9.0	7.4	10.1	0	26.5
	Total	**36.8**	**71.7**	**66.4**	**2.0**	**176.9**

19.　　　　On paragraph 18(a), the expenditure is for the procurement of around 1 200 additional PCs, replacement of outmoded IT facilities, enhancement of the VTC's Internet servers and access facilities, upgrading of the library system, and installation of a web-based teaching system, remote access service and video conferencing facilities.

20.　　　　On paragraph 18(b), the expenditure is for the establishment of data warehouses to capture the VTC's management information, enhancement of its MIS, upgrading of its MIS interface from client-server based to wed-based environment, setting up of an Executive Information System and development of new MIS applications such as the Human Resources Management System.

21.　　　　On paragraph 18(c), the expenditure is for the enhancement of VTC's network infrastructure, upgrading of its Internet security and communication speeds, and improvement to its network security system.

Encl. 2

22.　　　　A detailed cost breakdown for the estimated cash flow and individual IT programmes is at Enclosure 2.

/(ii) Recurrent .....

(ii) Recurrent expenditure

23.   Recurrent expenditure for maintenance and operation will increase as the new facilities are implemented. The VTC estimates that the enhanced IT facilities will give rise to an additional annually recurrent expenditure of $14.3 million upon full implementation. This amount is made up of -

      (a) $12.4 million for maintenance charges of computer equipment (including hardware and software) and necessary annual licensing fees, and

      (b) $1.9 million for maintenance and rental charges of communication equipment (including hardware and software) and data communication lines.

24.   The VTC will absorb these recurrent costs within its existing level of subvention from Government.

BACKGROUND INFORMATION

25.   The last major improvements to the VTC's IT infrastructure were carried out two years ago with funds amounting to $31.967 million approved by the Finance Committee in October 1997. The improvements then were for developing a campus network, upgrading the management information system which had been in use for over ten years then, and installing client-server system in two technical institutes. Progress of these improvements is set out at Enclosure 3.

Encl. 3

26.   However, the improvements in 1997 only enabled the VTC to build up a basic network, conduct vocational education with moderate assistance through the use of IT, and upgrade its existing MIS. To fully cater for the latest needs of vocational education and the information needs of the VTC's management, substantial improvements to the VTC's IT infrastructure and services are required as set out in paragraphs 6 to 14 above. The proposed enhancements seek to provide new functions for more efficient decision-making and to enhance the quality of education. The old MIS will continue to be used.

Education and Manpower Bureau
March 2000

Enhancement to IT Infrastructure and Services
Schedule of Implementation

IT Programme	2000	2001	2002	2003
	01 02 03 04 05 06 07 08 09 10 11 12	01 02 03 04 05 06 07 08 09 10 11 12	01 02 03 04 05 06 07 08 09 10 11 12	01 02 03 04 05 06 07 08 09 10 11 12

(I) Use of IT for Quality Vocational Education
- Additional PCs for Students (3 Phases)
- Web-based Teaching and Learning Service
- Upgrading of Dynix Library and Enhancement of ITTDC
- Virtual Help Desk Service
- Time-tabling System and Automatic Software Distribution and Upgrade
- Remote Dial-up and Mobile PC Access Service
- Video Conferencing Services
- Replacement of Outmoded IT Facilities
- Increased Internet Access and Server Enhancement
- Data Warehousing of Student Data (2 Phases)

(II) MIS and User Services Enhancement
- Enhancement of MIS Infrastructure (2 Phases)
- Data Warehousing of Council Data (3 Phases)
- New MIS Application (2 Phases)
- Executive Information System (3 Phases)
- Web-based MIS and Extranet - Online Survey

(III) Network Infrastructure Enhancement
- Campus Network Backbone/Server/Desktop Performance Enhancement (2 Phases)
- Internet Upgrade (2 Phases), Enhancement of VTC Network (WAN) and Electronic Library Upgrade
- Training Centre Complex Networks
- Network Security - Virtual Private Network

Legend : Student
MIS
Infrastructure

Detailed Breakdown of Costs
of VTC's IT Infrastructure Enhancement Project

IT Programme	Manpower cost	Hardware and software solution cost (including implementation services)	Total cost
	$'000	$'000	$'000
(I) Use of IT for quality vocational education			
Additional PCs for students (3 phases)	-	20,637	20,637
Web-based teaching and learning service	3,930	10,558	14,488
Upgrading of Dynix Library System and enhancement of the Information Technology Training and Development Centre	323	9,824	10,147
Virtual help desk service	3,543	4,533	8,076
Time-tabling system and automatic software distribution and upgrade	1,332	6,466	7,798
Remote dial-up and mobile PC access service	2,296	4,552	6,848
Data warehousing of student data (2 phases)	1,572	6,929	8,501
Video conferencing services	1,048	4,450	5,498
Replacement of outmoded IT facilities	396	3,892	4,288
Increased Internet access and server enhancement	683	2,459	3,142
Sub-total	*15,123*	*74,300*	*89,423*

/**(II)** .....

IT Programme	Manpower cost	Hardware and software solution cost (including implementation services)	Total cost
	$'000	$'000	$'000
(II) MIS and user services enhancement			
Enhancement of MIS infrastructure (2 phases)	2,065	11,298	13,363
Data warehousing of VTC data (3 phases)	2,452	10,831	13,283
New MIS applications (2 phases)	2,139	9,954	12,093
Executive Information System (3 phases)	3,023	8,841	11,864
Web-based MIS and Extranet - online survey	3,185	7,180	10,365
Sub-total	*12,864*	*48,104*	*60,968*
(III) Network infrastructure enhancement			
Campus network backbone/server/desktop performance enhancement (2 phases)	727	10,300	11,027
Internet upgrade (2 phases), enhancement of VTC network and electronic library upgrade	605	7,210	7,815
Training Centre Complex Networks	417	4,500	4,917
Network security - virtual private network	480	2,200	2,680
Sub-total	*2,229*	*24,210*	*26,439*
Grand total	*30,216*	*146,614*	*176,830*

Progress of IT Improvement Project Approved by Finance Committee of the Provisional Legislative Council in October 1997

The progress of the various deliverables of the project approved in October 1997 is as follows -

Campus Network

All campus networks for the seven technical institutes, VTC headquarters and local area networks for the three training centre complexes have been set up and linked together with the existing campus networks at the two technical colleges to form a Council-wide internal network.

Management Information System

(a) The Dynix Library System has been upgraded. Basic Electronic book processing/borrowing/returning system was implemented;

(b) the Financial Information System (FIS) Phase I comprising General Ledger, Accounts Payable and a Purchasing System, has been implemented;

(c) development of FIS Phase II for operational units and the Full-time Payroll System is in progress;

(d) a Student Admission System has been implemented; and

(e) modules for student registration, term-start and pre-examination for the Student Records System have been implemented. Development of other modules including post-examination and term-end processing is in progress.

Client Server System

The replacement of an old mini-computer with a new server system for the Tuen Mun Technical Institute and Kwai Chung Technical Institute has been completed.