(D R A F T)

REPORT OF THE TASK FORCE ON IT MANPOWER

Develop our Workforce for the Information Economy

Information Technology and Broadcasting Bureau
July 2001

Develop our Workforce for the Information Economy

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Foreword

We are now in the Information Age, where success is directly linked to the quality and skills of a reservoir of information technology (IT) manpower. Hong Kong's future prosperity, as a leading player in the information economy and a premier digital city in the globally connected world, requires a focused and dedicated approach in building a skilled and competent IT workforce.

Along with other economies we must compete with, we have to address the shortfall in IT manpower resources which has become a global phenomenon.

There is no other choice – for the sake of Hong Kong's economic future, we must bridge the gap between supply and demand. That is why we have included the development of a skilled IT workforce as a major strategic area under our 2001 Digital 21 IT Strategy.

This is a subject which involves not just the Government or the IT industry but also the business sector, academic institutions, industry support bodies, and virtually the whole community as the development of IT practically affects all sectors of the economy.

The **Task Force on IT Manpower** has intensively examined measures to bridge the IT manpower gap since its inception in November last year. Within nine months, it has come up with a package of immediate and longer term measures as set out in this Report. The implementation of these measures is crucial to Hong Kong's future economic success. I would like to take this opportunity to thank the Task Force members for their hard and dedicated work, and valuable contributions in the preparation of this Report. We are also grateful to the various bodies like universities, chambers of commerce and trade-related organisations which have provided comments to us when we widely consulted them on the subject. Together we shall ensure that Hong Kong will continue to succeed and scale new heights in the global information economy.

Mrs Carrie Yau
Secretary for Information Technology and Broadcasting
July 2001

Executive Summary

To ensure Hong Kong's ability to compete and succeed in the global information economy, we need to implement effective short and medium term measures to address market requirements for IT skills, and to adopt longer term, sustainable solutions to develop a skilled IT workforce for the future.

An estimated 61 000 people were engaged in IT-related work in Hong Kong as at March 2000. And IT professionals are required not only in the IT industry but in almost every other sector of the economy. This has led to a shortfall in IT manpower supply that has become a global phenomenon. There is an estimated global deficit of 500 000 IT-related jobs that is forecast to grow to one million next year, and demand may outstrip supply by as much as 20% within five years.

The Government has recognised the importance of providing an adequate supply of quality IT manpower. We are fully committed to building an IT-savvy workforce to sustain the development of our information economy. We have identified this as a strategic area we need to focus on in the 2001 Digital 21 IT Strategy.

The Government has consistently made substantial investments in education and training. Excellent foundations in basic education are laid by implementing a visionary 5-year strategy in IT education. Tertiary institutions have responded positively to market demand and introduced various IT curricula at degree level or above. Five thousand graduates from IT and related disciplines are expected to enter the IT workforce each year. Vocational training, employees retraining and industry support bodies now provide a wide range of IT programmes below degree level. We estimate that there will be over 3,000 IT personnel with sub-degree qualifications each year for entering into the workforce for IT-related employment.

To support life-long IT learning, which is crucial in a knowledge-based economy, there is a wide spectrum of continuing and professional education programmes provided by publicly funded bodies, local commercial training institutions, and overseas institutions operating in Hong Kong.

All of these initiatives complement one another and provide a full range of training opportunities from basic education to life-long learning.

The **Task Force on IT Manpower** has examined the situation in Hong Kong and elsewhere, and recommended a package of immediate and longer term measures on how best to bridge the gap between supply and demand. These measures are :

- Implement the scheme to admit Mainland IT professionals.
- Streamline the admission regime for overseas IT professionals.
- Expand post-secondary programme.
- Encourage world-renowned private IT training institutions to operate in Hong Kong.
- Implement an academic plan in the Cyberport to develop professional IT talent.
- Accredit IT skills below degree level.
- Encourage Hong Kong and Mainland talent overseas to work here.
- Intensify exchange/internship programme with emphasis on IT.
- Collaborate with the industry to provide professional IT training for secondary students.
- Enhance output of university graduates in IT and related disciplines and increase IT content in both IT and non-IT disciplines.
- Promote and accept credit transfer/exemption in universities for IT-related disciplines.
- Set up corporate schools in IT field in collaboration with the industry.
- Explore the feasibility of establishing a community IT college.

The Task Force considers the implementation of these measures crucial to help strengthen IT manpower supply for sustaining our development in the global information economy. But Government's efforts alone will not be sufficient. This also involves the industry, business sector, academic institutions, industry support bodies and the community as a whole. We must work hand in hand together to build an IT-savvy workforce for Hong Kong.

Chapter 1 - Introduction

Global Situation

In the new information economy which emphasizes on knowledge, innovation and technology competency, development of human capital has become one of the key elements in the formula of success of a leading digital city. One of the major requirements for successful transformation to an information economy is the building of a highly competent information technology (IT) workforce. Skilled IT professionals are now the most valuable asset which countries/economies all over the world are competing for. As IT impacts on the economy as a whole, IT professionals are in demand not only in the IT industry but in practically all sectors of the economy.

> ***"Human capital is the most precious asset of an information society but, while we need years to nurture a talent, technology changes almost everyday. Therefore, the best IT manpower strategy works like a symphony, in which the sound foundation of basic IT education is augmented by the flexible and market-oriented training provided by the private sector."***
>
> **** Professor Charles Kao***
> ***Chairman, ITx Services Ltd.***
>
> ***Internationally recognised as the "Father of Fiber Optics" and former Vice Chancellor of the Chinese University of Hong Kong***

With the rapid development of the information economy, there is a shortage in the supply of IT manpower which has become a global phenomenon. The current worldwide IT skills deficit is estimated to be approaching 500 000. It is forecast to grow to one million by 2002. In five years' time, global demand for IT skills may outstrip supply by as much as 20%.

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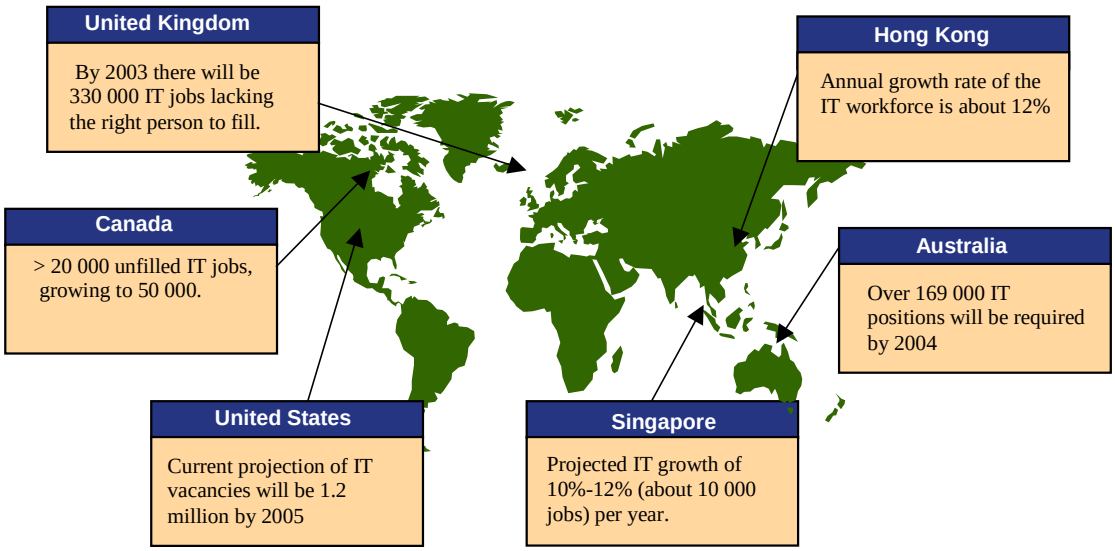
* Professor Charles Kuen Kao is recognised internationally as the 'Father of Fiber Optics'. He has worked in the technology field since the early 1960's and it was his pioneering research that spawned the birth of the now ever-expanding optical fibre communication industry. Among his international honours and awards are the Stewart Ballantine Medal, Rank Prize, L.M. Ericsson International Prize, Alexander Graham Bell Medal, Marconi International Fellowship, Faraday Medal of IEE, the Japan Prize, and the Charles Stark Draper Prize.
Professor Kao was formerly the Vice Chancellor of the Chinese University of Hong Kong. He retired from this position in 1996. Presently, he is the Chairman of ITx Services Ltd., a consultancy business.

Global Demand for IT Workforce



Hong Kong Position

Hong Kong is no exception. We have pledged in our Digital 21 IT Strategy, which was first promulgated in 1998, to make Hong Kong a leading digital city in the globally connected world. We have embarked on a comprehensive and visionary programme of initiatives to implement the strategy. These initiatives drive the development of a vibrant IT industry and the emergence of a buoyant e-culture in the community. All these activities impose an increasing demand on the supply of IT manpower.

The Government fully recognises the importance of developing our IT workforce. We are totally committed to enhancing the supply of quality IT manpower and equipping our future generations with the capabilities to learn and use IT. The goal is to develop an IT-savvy workforce to support the development of the information economy.

2001 Digital 21 IT Strategy

In the newly promulgated 2001 Digital 21 Strategy, we have identified "developing Hong Kong's workforce for the information economy" as one of the key result areas to focus on in order to drive Hong Kong's development as a leading digital city. The policy objective is to :

- Implement effective short and medium term measures to address market requirements for IT skills.
- Adopt long term and sustainable solutions to develop a skilled IT workforce for the future.

Task Force on IT Manpower

To advise the Government on how we should strengthen IT manpower supply, we have established a **Task Force on IT Manpower** under the Information Infrastructure Advisory Committee, the main advisory committee of the Government on IT policy. The Task Force was charged with examining the IT manpower shortage issue and recommending suitable measures to address the situation.

The Task Force comprises representatives from the IT industry, employers, professional bodies, industry associations, education and training institutions, as well as the relevant Government departments. Its membership is set out in Annex A. It has proved to be an effective forum to channel essential IT manpower information from the demand side of the manpower equation to the supply side. Its key role is to identify and drive initiatives that bridge the IT manpower gap in Hong Kong.

The Task Force has reviewed the various issues relating to IT manpower supply, including the development of IT in education, training of IT professionals, admission of Mainland and overseas professionals, accreditation of IT skills, as well as IT manpower development policies of other countries, etc. Based on the deliberations of the Task Force, we have produced this Report.

This Report comprises this introduction (Chapter l) and the following chapters: Chapter 2 sets out where we stand in providing IT education and training, covering basic education, tertiary education, vocational training and employees retraining, private sector training, etc.; Chapter 3 illustrates how we in Hong Kong strive for excellence in developing IT talent, with examples of some of the achievements of IT talent at work; Chapter 4 examines the current IT manpower situation and the anticipated demand in the coming years; Chapter 5 sets out the immediate and longer term measures considered by the Task Force to strengthen the supply of quality IT manpower; Chapter 6 assesses how the future supply will meet the demand; and Chapter 7 maps out our way forward to conclude the Report.

Chapter 2 - Where We Stand

Hong Kong is determined to be successful in the new information economy. The Government has consistently made substantial investments in education and training, and has in recent years increased its focus on IT. We have laid excellent foundations in basic education by implementing a visionary 5-year strategy in IT education. The tertiary institutions have responded positively to the IT manpower demand and have introduced various IT curricula at degree level or above. Our vocational, retraining and industry support bodies also now provide a wide range of IT training below degree level which serves to upgrade the skills of the workforce. Furthermore, to support life-long learning, which is crucial in a knowledge-based economy, there is a wide spectrum of continuing and professional education programmes in IT provided by publicly funded bodies, local commercial training institutions, and overseas institutions operating in Hong Kong. All of these initiatives complement each other and provide a full range of training opportunities from basic education to life-long learning to sustain the development of an IT-savvy workforce.

Investment for the Future

Investment in education, always the largest single item of Government expenditure, has increased continuously over the years irrespective of economic changes as shown by this table :

Financial Year	Total Education Expenditure ($ billion)	Growth	As a Percentage of Gross Domestic Product
1997-1998	47.0	2.4%	3.6
1998-1999	48.5	3.1%	3.8
1999-2000	50.3	3.8%	4.1
2000-2001*	51.7	2.8%	4.1
2001-2002#	55.3	7.0%	4.3

* Revised estimate
\# Estimate

Laying a Solid Foundation in Basic Education

We have launched a five-year (1998-99 to 2002-03) strategy "Information Technology for Learning in a New Era" in primary and secondary schools to drive the development of IT in education, with an investment of $3.2 billion (US$ 410 million) in capital spending and over $550 million (US$ 70 million) in annual recurrent expenditure. The aim is to turn our schools into dynamic and innovative learning institutions where students can develop capabilities to process information effectively and efficiently, as well as adopt the mindset required for independent life-long learning. The key features and achievements of the strategy include :

Teacher Enablement

- Provided about 17 000 IT training places to teachers in 1999.
- Providing a further 68 000 training places by the end of the 2002-03 school year.

- Targeting 75% of teachers to reach a "comfortable" level of IT competency, 25% to reach a "competent" level, and one to two teachers in each school to reach a "creative" level by the 2002-03 school year.

Grants and Incentives

- Cash grants to schools for purchasing computers.
- Incentive grants to schools for making their computer facilities available to students after normal school hours.
- Funding to enable secondary schools to purchase notebook computers for loan to needy students.

Access and Connectivity

- Completed provision of Internet access to all schools, with 90% connected by broadband or leased line.
- Developed an education-specific portal, Hong Kong Education City.net (www.hkeducity.net) connecting all schools, students, teachers, parents and the public.
- Equipped each primary school with 40 computers and each secondary school with 82 computers.
- Installed 1 000 computers at children and youth/community centres for use by students
- Established multi-media learning centres at about 280 schools (or 23% of total), each centre equipped with 40 computers.

Apart from strengthening the hardware infrastructure of schools, we have also placed emphasis on providing software support. We have provided the following to schools :

- A non-recurrent grant for procurement of IT equipment and application software.
- An Educational Software Preview Library with over 2 500 pieces of software suitable for teaching and learning various subjects in local schools.
- Free distribution of exemplar Computer-aided Learning packages to schools, with others also under development.
- The Hong Kong Education City provides a repository of resources including lesson plans, PowerPoint presentations, pictures, education television programmes and other video clips, educational software and useful links.
- A Digital Library has been launched in the Hong Kong Education City with multimedia storybooks for primary school students.
- Educational software displays are organized at the Information Technology Education Resource Centre to introduce the latest suitable educational software to schools.
- An e-learning platform has been established to host teaching and learning web-based resources with comprehensive course management tools.
- The Hong Kong Education City launched a series of i-Clubs to act as a platform for subject teachers to share their ideas and resources on the web. It facilitates the building up of a learning community amongst subject teachers.

Separately, the $5 billion (US$640 million) Quality Education Fund also provides funding support to various school-based IT projects. So far, 630 projects have been approved involving total funding support of $700 million (US$90 million).

Under this strategy, we have provided access and connectivity to all schools. They are now well connected and equipped with computer and Internet facilities. Teacher enablement has been strengthened, and curriculum and resource support is provided for the delivery of IT in education. We have targeted to use IT as a teaching medium for 25% of the school curriculum by the 2002-03 school year. We envisage

that in the future all Hong Kong students will become computer literate and competent to make use of IT for life-long learning.

An IT-competent Tertiary Sector

Postgraduate and Undergraduate Courses

Currently there are eight University Grants Committee (UGC)-funded institutions offering IT and related degree studies at postgraduate and undergraduate level. The total number of places (estimated intake) offered each year for IT programmes (e.g. computer engineering, information technology, information systems, etc.) is over 2 500. A breakdown of the estimated intake by institutions from 2001 to 2003 is set out in Annex B. But many graduates go into IT and related field with degrees in mathematics, science or some branches of engineering other than computer/information. If we take IT-related disciplines (e.g. electronic and electrical engineering, communications technology, mathematical science, etc.) into account, the total number of places (estimated intake) offered each year exceeds 5 300. Of the 14 500 students who are offered first-year-first-degree places at the eight UGC-funded institutions each year, around 25% study in IT-related disciplines. If we also take into account courses offered by the Open University of Hong Kong and UGC-funded institutions on a self-financed basis, the total number of undergraduate and postgraduate places offered each year in IT-related disciplines is over 8 200. The situation for 2001 – 2003 is set out as follows :

	2001	**2002**	**2003**	**Average**
UGC-funded programmes				
a) Postgraduate courses in IT	555	575	580	570
b) Undergraduate courses in IT	2 000	1 990	1 985	1 990
Sub-total	**2 555**	**2 565**	**2 565**	**2 560**
c) Other IT related post-graduate courses	1 045	990	1 040	1 025
d) Other IT related undergraduate courses	1 755	1 755	1 725	1 745
Sub-total	**2 800**	**2 745**	**2 765**	**2 770**
Self-financed courses offered by Open University of HK and UGC-funded institutions in IT				
a) Postgraduate courses in IT	1 190	1 225	1 180	1 200
b) Undergraduate courses in IT	1 700	1 765	1 735	1 730
Sub-total	**2 890**	**2 990**	**2 915**	**2 930**
Total	**8 245**	**8 300**	**8 245**	**8 260**

Source: Education and Manpower Bureau

The unemployment rate for university undergraduates studying IT courses is only 1.1%, while postgraduates in IT have a full employment rate of 100%.

The supply of IT graduates for entering into the workforce is related to the participation rate, which is the percentage of students graduating from IT and related courses for engaging in IT-related employment. There are also some IT professionals already engaged in IT-related work who take these courses

(especially self-financed courses sponsored by their employers) to enhance their knowledge and upgrade their skills. Taking these into account and assuming a participation rate of 80% for IT graduates for UGC-funded courses, 50% for graduates in other UGC-funded IT-related programmes, and 50% for all self-financed courses, the average supply of IT graduates each year who can engage in IT-related employment is estimated at around 5 000[1]. A list of UGC-funded postgraduate and undergraduate programmes in IT, and examples of self-financed IT programmes offered, is set out in Annex C.

Apart from providing IT and related programmes, the universities have embarked on various activities to ensure that all tertiary students can study in an environment which promotes the wider use of IT, and that all students have free and readily available access to computers on campus. To this end :

- All tertiary students have e-mail addresses and have free access to the Internet via computers on campus.
- All institutions have computer laboratories which can readily be used by students.
- Some institutions have installed plug-in points at various convenient locations on campus to facilitate the use of computers by students on an "anywhere, anytime" basis.
- First-year students of some institutions can purchase notebook computers at concessionary prices.
- All institutions have lecture facilities which are well equipped with computers. In some institutions, all classrooms have been networked.
- Most institutions have made it compulsory for students to take courses in English, which is de facto the international language for IT and the Internet, and to pass the corresponding tests in their studies. Some institutions have made proficiency in English an exit test for students to pass before they can graduate.

All tertiary students are now offered mandatory or optional computer courses. Some institutions require students to attend at least one IT-related course or an IT proficiency test and the satisfactory completion of which is a prerequisite for graduation. Others have set up IT literacy benchmarks to ensure graduates are IT competent for their future careers. The arrangement of an IT exit test is also being examined. The ultimate goal is that all graduates should emerge from universities with IT competence for both career development and life-long learning.

Sub-degree Courses

Both UGC-funded institutions (e.g. City University of Hong Kong, Hong Kong Polytechnic University, etc.) and the Vocational Training Council (VTC) offer sub-degree courses in IT for those who may not be able to receive university education. The total estimated intake each year is around 4 800 for 2001-2003, as shown in the following table :

[1] The participation rates are assumptions used to estimate the supply of IT professionals for entering into the workforce. The rate of 80% for IT graduates is based on employment survey as adopted in the Vocational Training Council Manpower Survey Report 2000 for the IT sector. The 50% rate for graduates of IT-related discipline is based on a conservative estimate that only half of the graduates from IT-related disciplines would engage in IT-related work. As regards graduates of self-financed courses, a conservative rate of 50% is adopted as some graduates may have already been engaged in IT-related work and the courses are more for skills upgrading.

	2001	2002	2003	Average
UGC-funded institutions				
a) Sub-degree courses in IT	950	990	990	980
b) Sub-degree courses in other IT related disciplines	540	580	580	570
Sub-total	**1 490**	**1 570**	**1 570**	**1 550**
VTC sub-degree IT courses	3 240	3 230	3 230	3 230
Sub-total	**3 240**	**3 230**	**3 230**	**3 230**
Total	**4 730**	**4 800**	**4 800**	**4 780**

Source : Education and Manpower Bureau

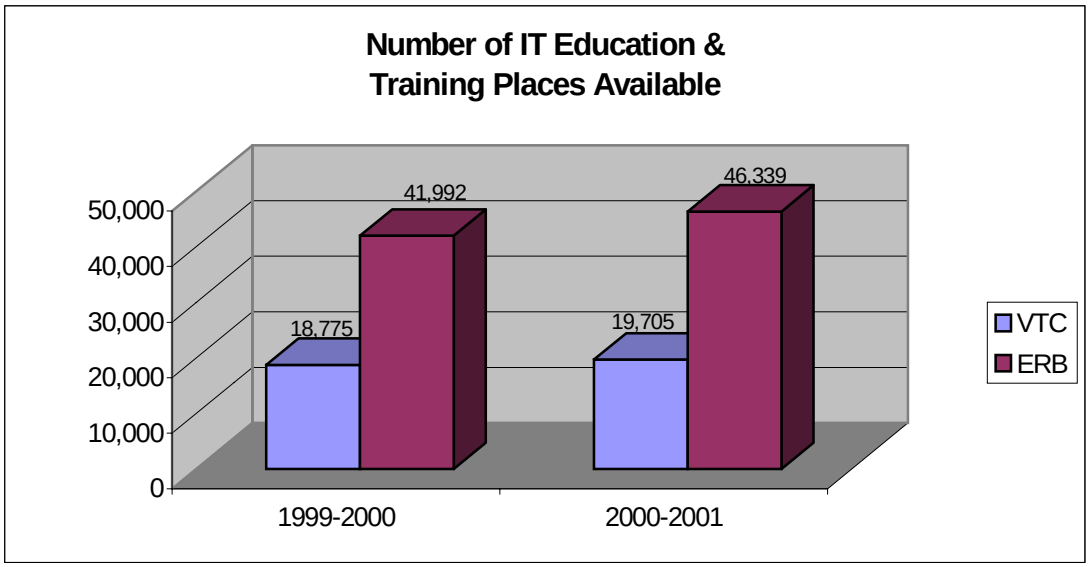
Based on employment surveys, the VTC estimates that the participation rate of sub-degree graduates in IT and related employment is over 60%. Using this as the basis, there is a supply of around 3 000 IT personnel with sub-degree qualification for entering into the workforce for IT-related employment each year.

Vocational Training and Employees Retraining

Vocational Training Council and Employees Retraining Board

We have provided a wide range of IT courses for vocational training as well as retraining which helps employees displaced from one sector to upgrade their skills for switching to employment in other sectors. Both the VTC and the Employees Retraining Board (ERB) offer IT-related courses and certification programmes for our workforce to migrate to a knowledge-based economy. The Institute of Vocational Education (IVE) of the VTC offers around 6 000 places annually on programmes relating to computing studies and electronic engineering. The Information Technology Training and Development Centre (ITTDC) of the VTC provides each year about 12 000 training places under its IT skills upgrading courses for in-service personnel, and IT conversion courses for non-IT university graduates. In addition, the ITTDC also provides a Youth Pre-employment Training Programme of about 1 000 places with IT modules in 2000-01. The Centre is also in the process of developing an e-learning portal which could offer further training in IT, thus enabling the graduates to upgrade their skills in their own time and at their own pace.

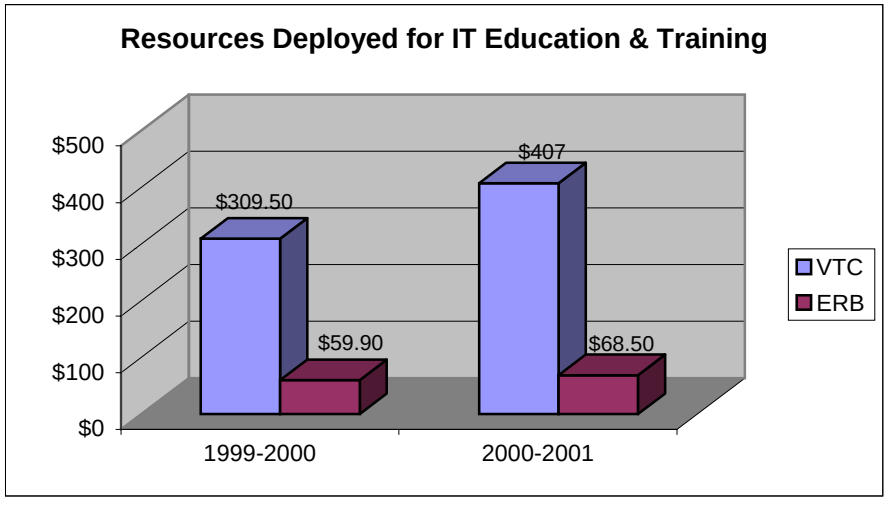
The ERB also funds different non-profit making organizations to provide various types of training courses. The majority of the ERB's IT-related programmes are part-time courses focusing on basic software, applications and word-processing. Over 40 000 short-term basic IT skill training places are offered each year to help trainees sustain their employment in a knowledge-based society.



Source: Vocational Training Council and Employees Retraining Board

The VTC and the ERB have also jointly run an IT Assistant Training (ITAT) Programme, targeting junior IT assistant level for those with secondary 3 or above education. The 10-week programme provides practical training in basic IT skills, office and database applications, web authoring, e-commerce and multi-media production. The pilot course has received positive response from the market and has achieved a placement of over 90% for the trainees. About 900 training places were offered in 2000-01. Another 1 400 places will be provided in 2001-02 to meet the demand of trained IT manpower at junior level.

The Government has allocated a substantial amount of resources to the VTC and the ERB for IT education and training. The table below highlights resources deployed from 1999 to 2001.

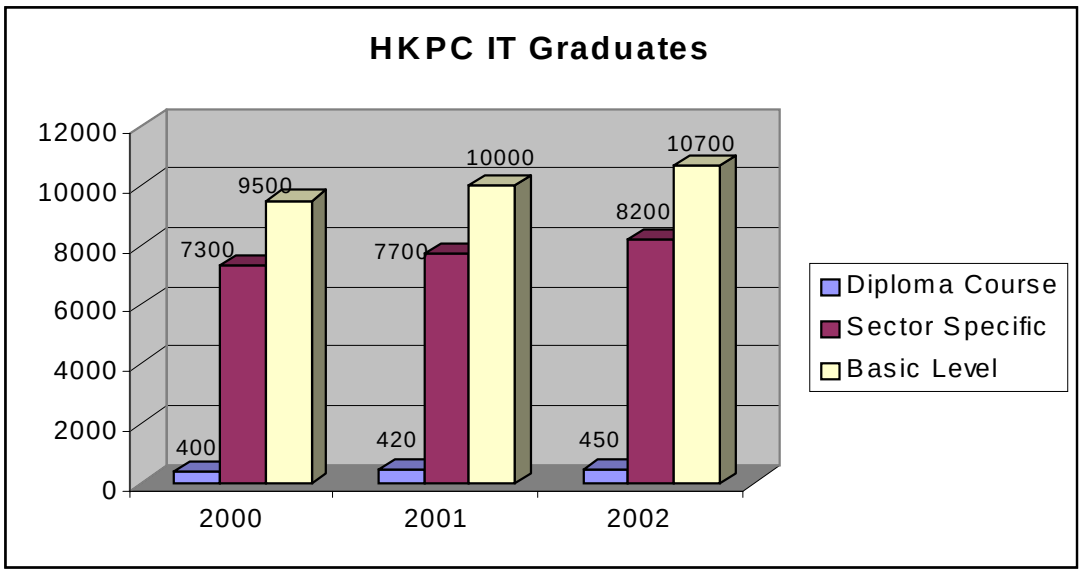


Source: Vocational Training Council and Employees Retraining Board
Dollar figure in million
(Among the $407 million deployed by the VTC in 2000-01, $67 million was a capital expenditure)

The VTC is also implementing a three-year strategy with $180 million (US$23 million) investment to enhance its IT infrastructure and services so as to strengthen the quality of teaching and learning for its programmes.

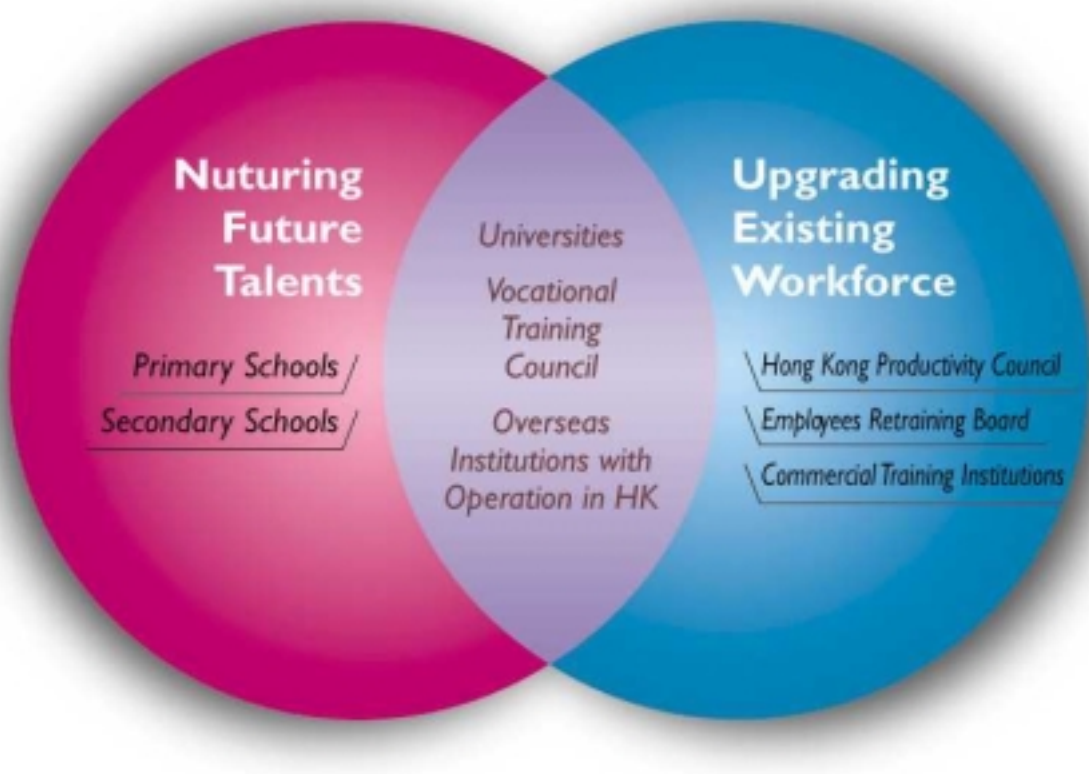
Hong Kong Productivity Council

The Hong Kong Productivity Council (HKPC) is a multi-disciplinary industry-support organisation established to promote productivity and the use of more efficient methods in business operation, including the use of IT. The Council specially targets the small-and-medium-sized enterprises (SMEs). It provides IT-related prorammes in the form of in-class training, in-company training or co-organized distance learning courses with international institutions. Nearly 20 000 places are offered each year.



The IT courses of the HKPC cover :

- Basic level IT training to the employees of SMEs to enable them to make greater use of IT in their work, such as office automation, etc.
- Sector-specific IT training to particular industries, such as computer-aided design, e-commerce applications, etc.
- Diploma courses to enable in-service IT personnel to upgrade or broaden their skills, such as learning an additional programming language, etc.



There are also schemes supported by the Government to upgrade the IT skills of the employees of SMEs as a part of the separate initiative to enhance the competitiveness of SMEs in Hong Kong.

Continuing and Professional Education for Life-long Learning

IT is a unique discipline which requires continued education and training throughout one's career. Accordingly, the provision of continuing and professional education in IT for life-long learning is essential to sustain our development as a knowledge-based economy. A wide range of continuing and professional education opportunities in IT training are offered by publicly funded bodies on self-financed basis, local private training institutions on commercial basis or overseas institutions with operation in Hong Kong. They together offer a full spectrum of choices for our workforce to upgrade their IT skills on a continuous basis to cater for rapid technological development and to meet the ever-changing challenges of the new information economy.

Continuing and Professional Education Offered by UGC-funded Institutions

Continuing and professional education programmes are offered by many of the UGC-funded institutions, which provide students with various IT-related courses and certification programmes on a self-financed basis. Some of the key institutions offering such programmes are :

- School of Professional and Continuing Education (SPACE) of the University of Hong Kong.
- School of Continuing and Professional Education (SCOPE) of the City University of Hong Kong.
- School of Professional Education and Executive Development (SPEED) of the Hong Kong Polytechnic University.
- School of Continuing Education of the Hong Kong Baptist University.

- School of Continuing Studies (SCS) of the Chinese University of Hong Kong.
- Division of Continuing Professional Education (DCPE) of the Hong Kong Institute of Education.

Commercial Training Institutions

Private training institutions offer education, accreditation or certification programmes on a commercial basis, providing IT training programmes with a flexible framework to meet changing market demands and to cope with rapid technological development. They play a crucial role in supplementing training programmes offered by publicly funded institutions. These training institutions tend to focus on three main areas, namely, basic desktop application skills, vendor specific certification courses, and specialist certification and end-user training.

At the basic desktop application level, students are typically non-IT professionals in need of acquiring simple IT skills. Vendor-specific certification courses, which make up the great majority of courses offered by private training institutions, are geared more towards those already in the IT profession. Upon completing the corresponding examination, students studying for a vendor specific certification will receive international credentials and recognition that they have acquired specific IT skills. As regards specialist certification and end-user training, it is a key source for in-service IT personnel to acquire skills and competency in the latest IT trends. Many of these institutions also cater for the training requirement of individual companies and provide tailor-made programmes for their IT employees.

A list of such programmes offered by private training institutions is set out in Annex D.

Overseas institutions with Operation in Hong Kong

Increasingly, as training institutions become more advanced in delivering their services through alternative media by using advanced technology (e.g. distance and online learning), more and more overseas universities and training institutions are establishing operations in Hong Kong by offering local students the opportunities to gain internationally recognised IT qualifications. The type of training provided also helps increase the international outlook of the local participants.

Presently, about 30 overseas tertiary institutions provide IT degrees or programmes to students in Hong Kong through distance or online learning. The following table sets out some common degree/diploma programmes offered by these institutions :

Degree Type	**Sample Courses**
Master of Science	Master of Science in Business Computing Systems Master of Science in Information Technology Management Master of Science in Software Engineering
Bachelor of Science	Bachelor of Science in Computing (Software) Bachelor of Science in Information Systems and Management Bachelor of Science in Information Technology
Graduate Diploma	Graduate Diploma in Applied Science Postgraduate Diploma in Business Information Technology

Chapter III – Striving For Excellence

Our universities have a key role to play in supplying quality IT manpower in support of our vision to develop as a leading digital city. It is mainly these institutions which inject new blood into the IT workforce. The urge to supply quality IT manpower has driven us to strive for excellence in developing training and research opportunities for IT personnel in our universities. But the universities are not aiming for such excellence in isolation. Already there are many co-operative ventures with the IT industry. This approach serves to best ensure that the activities cater for the needs of the market. Numerous successes are on record, and they underpin Hong Kong's position as a leading digital city.

Striving for excellence through partnership with industry

Authorized Academic Java Campus

The University of Hong Kong and Sun Microsystems have jointly run Asia's first-ever Authorized Academic Java Campus (AAJC) programme to teach, research and develop Java technologies. The AAJC programme is designed to deliver certified Java technologies training to students of higher education. It also provides consultation services to the industry, thus making Java technologies available to corporations through internship and project collaboration. The University campus has developed its own Sun training center which excels in the use of Java technologies and drives the incorporation of Java courseware into the University's curriculum. Students are able to work with local businesses on Java technologies pilot projects and can gain hands-on, real-world experience in the use of Java technologies.

Internet-Centric Excellence Centre

The University of Hong Kong has collaborated with Oracle and Sun Microsystems to operate the Internet-Centric Excellence Centre which acts as a focal point for innovation as well as applied research and training in Internet computing and e-commerce. It provides an Internet computing environment for the conversion of commercial possibilities into real business solutions using Internet technology.

INRIA-HKU Joint Research Centre

The University of Hong Kong has taken active steps to establish a student exchange partnership with the National Institute for Research in Computer Science and Control (INRIA) of France. Research at INRIA focuses on the field of information and communications technologies. The University and INRIA have already signed a Memorandum of Understanding to develop a joint research centre with co-operation programmes to create synergies in research and development work in information and communications technologies.

CUHK-Elec & Eltek Technology Centre

The Chinese University of Hong Kong and the Elec & Eltek Group have jointly founded the CUHK – Elec & Eltek Technology Centre which focuses on the development of Business to Business (B2B) e-commerce trading platform. It plays an important role in helping SMEs to adopt e-commerce to enhance their competitiveness.

Hong Kong CyberU

The Hong Kong CyberU is an advanced learning institution on the Internet co-founded by the Hong Kong Polytechnic University and the Pacific Century Cyberworks (PCCW). It integrates the expertise of the University in research, consulting and pedagogical development with PCCW's telecommunications and broadband capabilities to create the first Hong Kong-based virtual university. It offers Internet courses to students from Hong Kong, Mainland China, South-East Asia and other parts of the world who have access to broadband. These courses lead to academic qualifications awarded by the University, including degree and professional awards through part-time and online web-based studies. This initiative provides a truly multi-media enabled, interactive technology platform which allows students to learn on the basis of a self-directed and self-paced approach, complemented by online guidance.

City University of Hong Kong

The City University of Hong Kong has established strategic alliance with major international IT corporations as well as educational institutions including Computer Associates, Cisco, Oracle and the Carnegie Technology Education (CTE*)* of the Carnegie Mellon University which excels in software engineering education. The CTE partnership allows students to have "the best of both worlds", whereby a world-renowned overseas university creates the curriculum, designs teaching material and sets assessment, and the local university provides teaching staff to deliver the knowledge required for students in the local environment in Hong Kong.

Other Co-operative Initiatives with the Industry

Recently, Microsoft has pledged a contribution of $20 million (US$2.6 million) to the University of Hong Kong, the Hong Kong University of Science and Technology and the Hong Kong Polytechnic University. The donation is in support of a wide range of education and social programmes, including the provision of new training laboratories, support for local software development, and the expansion of training programmes for teachers, etc. The programmes will provide students and the related university faculties with access to training in the most advanced technologies. In addition, Microsoft certification programmes will be offered at each of the three universities.

Government Support and Industry Recognition

The Government has set up an Innovation and Technology Fund in 1999 with capital injection of $5 billion (US$640 million) to provide funding support to projects which are innovative and can contribute to the technological upgrading of Hong Kong. The universities can benefit from this funding source for carrying out IT research and development. The Government also supports activities such as the IT Excellence Awards held by the IT industry to promote and recognise the drive for excellence in the IT field.

IT Talent at work

There are numerous examples which can showcase the drive for excellence by our IT talent at work. All these have helped strengthening Hong Kong's status as a leading digital city. Some salient examples are -

TeleEye

TeleEye is a technological company established by the City University of Hong Kong and a group of talented researchers. It is mainly engaged in the development, marketing and sale of innovative products that utilise state-of-the-art signal processing technologies. The venture has successfully spun off from the

University to become a leading supplier in the world of remote visual management systems with extensive applications in various industries. It has also become successfully listed on the Growth Enterprise Market of the Stock Exchange of Hong Kong.

Cryptographic applications

The University of Hong Kong has established the Centre for Information Security and Cryptography, with Government funding support, to conduct research in cryptographic technologies. It has successfully developed a strong cryptographic software which has been bundled with the digital certificate issued by the Hongkong Post to provide electronic authentication services in e-commerce transactions. The Centre has subsequently spun off a part of its work as a commercial operation, and has attracted the support of venture capitalists. The spin-off operation provides the commercial market with technologies that address the basic concerns of authenticity, integrity, confidentiality and non-repudiation in electronic transactions.

iMBA of City University of Hong Kong

The interactive Master in Business Administration (iMBA) programme of the City University of Hong Kong has recently been ranked by Asiaweek as Asia's best distance MBA programme. The iMBA is the first local academic programme to be delivered through broadband Internet services. The programme also includes video lectures and students can have access to the University's online library and databases as well as benefit from on-call technical advice.

E-Library – Open University of Hong Kong

The E-library project of the Open University of Hong Kong was the joint winner in the education category of the "Stockholm Challenge Award" 2000 jointly organised by the City Government of Stockholm and the European Commission, beating other finalists from North America, Europe, Australia, and Africa. The project is a structural innovation in the development of distance education through a "library without walls". It now contains electronic files equivalent to 500 000 volumes of printed resources, all of which can be readily accessed through the Internet.

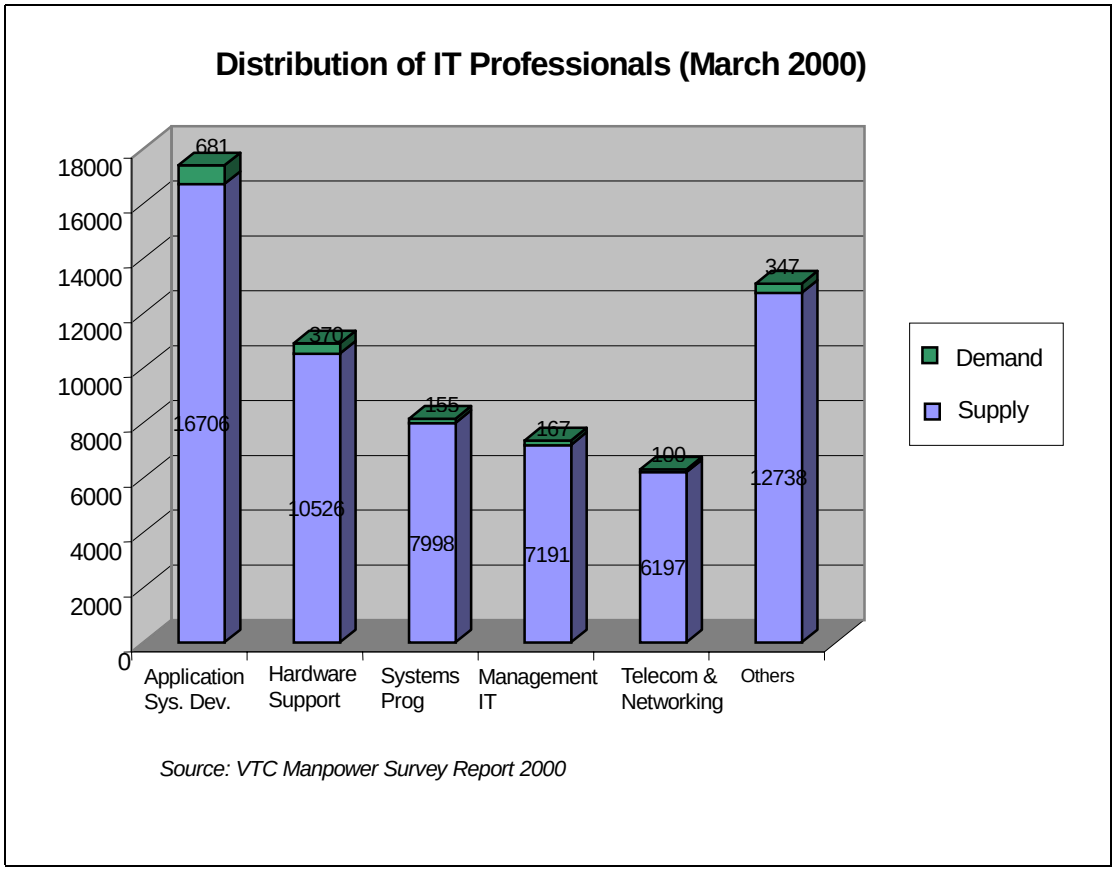
Digital Wen Yuan Ge Si Ku Quan Shu (文淵閣四庫全書)

The Chinese University Press and its commercial partner have jointly published the electronic version of Wen Yuan Ge Si Ku Quan Shu. The publication, including 3,460 words of Classic (jing 經), History (shi 史), Philosophy (zi 子) and Belles-letters (ji 集), contains around 800 million Chinese characters with the aim to bringing together all the works known at the time which were considered worthy of preservation. The electronic Si Ku Quan Shu was the first one in the world to adopt the ISO 10646 standard for the coding of Chinese characters.

Chapter 4 - IT Manpower Demand

IT Manpower Situation

The rapid development of the information economy has led to an increasing global demand for skilled IT manpower supply. This applies not only to the IT industry but also to all sectors of the economy. Based on the VTC's Manpower Survey Report 2000 in respect of the IT sector, it was estimated that in Hong Kong, as at March 2000, over 61 000 persons were engaged in IT-related work. About 80% of them were engaged either in the areas of application systems development, hardware support, systems programming, IT management or telecommunications and networking. For IT management and application systems development work, most employers offered an average annual remuneration package (covering basic salary, bonus/commission, housing allowance/benefit, and other regular allowance) from over $240 000 to $600 000 (US$ 31 000 – 77 000). Those with three or more years of experience in IT management, application systems development and database work are in most demand. At the time of the survey, the estimated number of vacancies was 1 800, or about 3% of the IT workforce.

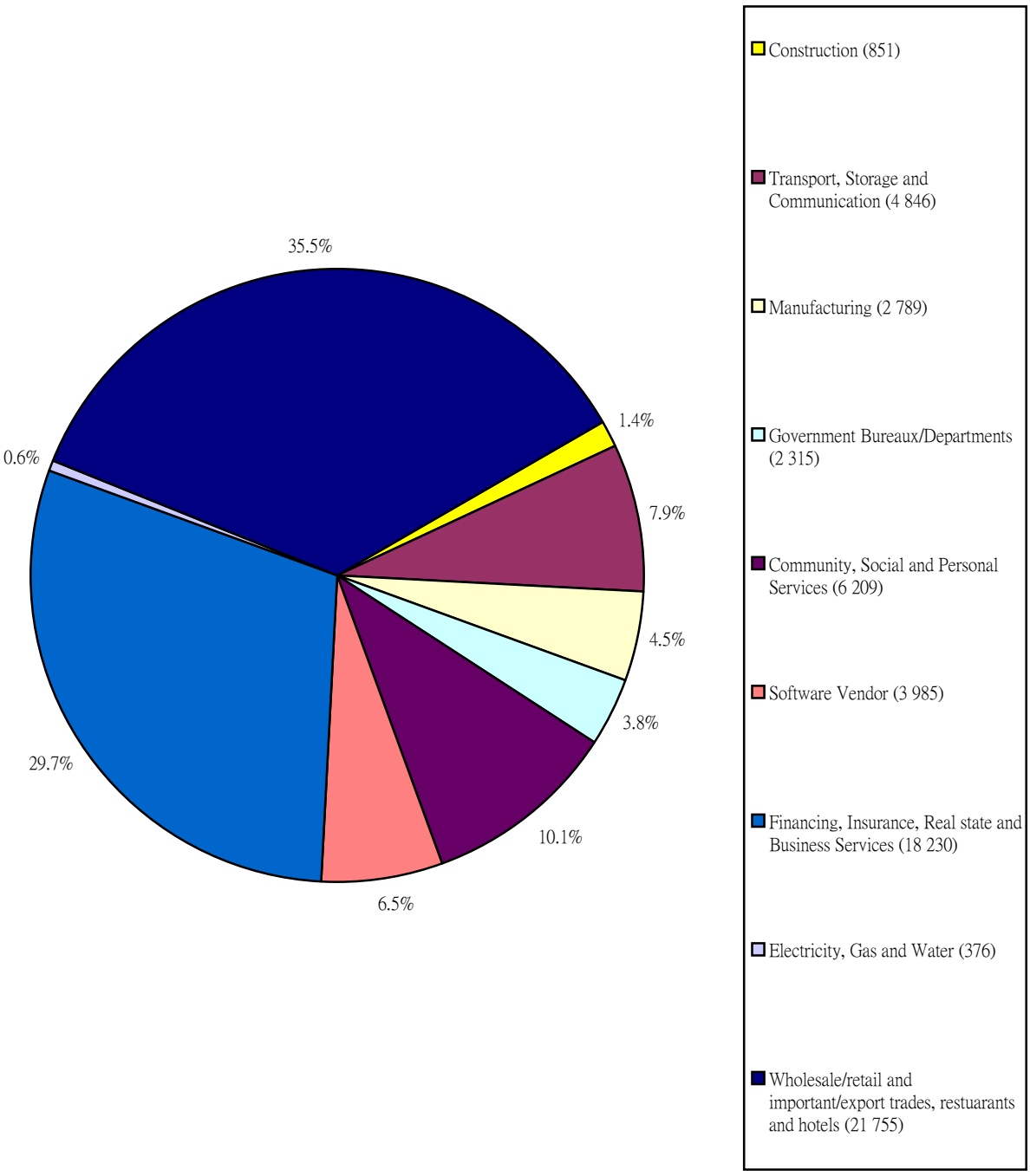


Source: VTC Manpower Survey Report 2000

Note: 'Others' refers to the 20.8% or 12,738 of the total number of IT professionals involved in systems operations, IT education and training, Internet/multimedia/content development, database and IT research.

The distribution of IT employees by sector as at March 2000 is as follows -

Distribution of IT Employees by Sector (as at March 2000)



Forecasts indicate that demand for IT personnel will continue to grow through the year 2005. Based on the Report on Manpower Projection to 2005 commissioned by the Government, the overall demand for IT personnel will grow at an annual rate of 11.8% from 50 000 in 1999 to about 98 000 in 2005. The average annual increase is around 8 000. The IT manpower requirement by industry sector is set out in Annex E. The demand will be greatest in the sector of financing, insurance, real estate and business services as well as the sector of wholesale, retail and import/export trades, restaurants and hotels.

Based on the VTC Manpower Survey Report 2000, the number of IT personnel in the market is forecast to increase from around 61 000 in the year 2000 to some 106 000 in the year 2004. The average annual increase is about 11 000. Around 55% of the new entrants should be at degree level or above, while the remainder should be at higher diploma/higher certificate/diploma/certificate level to serve the needs of the market.

It is clear that, in both immediate and longer terms, Hong Kong needs to adopt appropriate measures to meet the demand for IT manpower supply. Our future as a leading digital city, a major player in the information economy, hangs in the balance. What is at stake is our future economic growth. Only a skilled IT workforce will be able to maintain and enhance the overall competitiveness of Hong Kong in the global information economy.

Chapter 5 – Strengthening Supply and Quality Improvement

The Task Force on IT Manpower has intensively examined measures appropriate to enhance the supply of IT manpower in Hong Kong and to improve the quality so as to meet the increasing demand in our development as a leading digital city. With the rapid growth of the global information economy, the search for IT talent will continue worldwide in the foreseeable future. Economies all over the world need to address this issue, or they would risk lagging behind in the global IT race and e-business development. Hong Kong is no exception.

The Task Force noted that the IT manpower issue would best be addressed by a multi-dimensional approach, with short and longer term measures, focusing on both supply and quality. While immediate steps must be taken to meet the current shortfall, nurture our young talent and enhance existing IT capabilities, longer term measures have to be explored in conjunction with the tertiary institutions and other related bodies.

A. Immediate Measures to Address IT Manpower Needs

(a) Admission of Mainland IT Professionals

We have a shortfall of IT manpower at present. To bridge the gap immediately, there is an urgent need to admit more professionals from other places to meet our IT manpower needs and to maintain our competitiveness in the global information economy.

Many countries in the world are seeking to import IT professionals to help sustain the development of their economies. Annex E sets out some of the schemes introduced by other places to attract IT professionals. We must compete with these places to attract the best IT talent for Hong Kong. Some places are able to provide a rich pool of skilled IT professionals for us. The Mainland of China is one of these sources. Hong Kong, as a Special Administrative Region of China, has a unique advantage in capturing the supply of Mainland IT professionals.

The recent launch of the Admission of Mainland Professionals Scheme ("Professionals Scheme") will help increase the IT manpower supply in Hong Kong and redress the present anomaly between the comparatively liberal policy in the admission of overseas professionals and the restriction against the entry of Mainland professionals.

The Professionals Scheme is introduced on a sector specific basis, initially targeting at the IT and financial services sectors. Mainland IT professionals who possess skills and knowledge not readily available or in shortage locally, and who are offered a remuneration package broadly comparable with the market level for professionals here, can apply under the scheme. Candidates should have a good education background, normally possessing a first degree in the IT field. In special circumstances, good technical qualifications, proven professional abilities and/or relevant experience and achievements supported by documentary evidence may also be considered. No quota will be imposed but a review mechanism has been put in place. The admitted professionals will be eligible for right of abode in Hong Kong after seven years of residence.

The scheme was already launched on 1 June 2001. The Immigration Department will process an application within four weeks. We consider that the scheme will help enhance Hong Kong's economic and IT development whilst safeguarding job opportunities for the local workforce. The admission of IT professionals is expected to help generate new employment opportunities for the local workforce at sub-professional and technical levels. **The Task Force supports** the implementation of the scheme.

(b) Improving the Admission Regime for Overseas IT Professionals

> *'Increasingly, enterprises will use short-term employment arrangements or the outside market to provide moderate to deep expertise in commodity or rapidly changing technologies development. They will augment that strategy by seeking or developing – often from elsewhere in the enterprise – people with moderate to deep expertise in business or industry processes.'*
> *GartnerGroup*

Currently, a significant proportion, 16%, of the IT workforce in the Asia-Pacific Region, is made up of contract-based employees. Outsourcing some or all of the business IT functions is often seen as a way to alleviate staffing pressure, reducing training expenses and high staff turnover costs, thus freeing up time and resources of companies to focus on their core business activities. For large businesses, outsourcing to reduce staffing pressure is likely to be a growing trend.

Compared with other economies, the importation regime of Hong Kong is proactive and open for admitting skilled overseas professionals. We have adopted a visa-free policy for most of the countries/economies and their IT professionals can visit Hong Kong without obtaining any visa. Furthermore, they are not required to seek any statutory permissions for performing ordinary business activities in Hong Kong, provided that these activities do not fall into the definition of "employment". Subject to the circumstances of individual cases, overseas IT professionals can perform marketing activities, attend client meetings, provide technical advice, test-run their applications/programmes, perform technical/performance audits for client's systems and the like in Hong Kong without requiring a permit for employment. Understandably, in all cases, the Immigration Department will have the final discretion in the requirement for a work permit in order to safeguard Hong Kong's immigration control and to avoid misuse of the system.

To support Hong Kong's development as an information economy, we need to facilitate local companies to recruit overseas IT professionals where necessary and encourage these professionals to come and work in Hong Kong, bearing in mind that we face a global competition for such talent. We have to further streamline our importation regime with a view to keeping the application procedures as simple and user friendly as possible.

In this regard, we have made the application procedures for employment permit in respect of overseas IT professionals more user-friendly as follows :

- The Immigration Department has streamlined its procedures for processing applications for work permits. Barring exceptional cases, most applications can be processed within two weeks.
- A designated team has been set up in the Immigration Department to specially process applications for admission of overseas IT professionals.
- A special hotline (2829 3194) has been set up to handle enquiries and facilitate applications in urgent cases.
- Employers undertaking large-scale projects which require the admission of a large number of overseas IT professionals may submit entry applications to the Immigration Department in advance for consideration. Under this arrangement, the processing time can be reduced when the applications are formally submitted.
- The Immigration Department has uploaded information on the eligibility criteria for entry to Hong Kong for employment and other purposes for reference by employers and applicants (http://www.info.gov.hk/immd). Application forms cum guidance notes are available for

download from the departmental website.

The Task Force considers that these streamlined procedures will help facilitate local companies in bringing more IT professionals to Hong Kong to meet their operational needs, thus increasing the supply of IT manpower for both short term assignments and long term careers in Hong Kong. **The Task Force supports** the implementation of these streamlining measures.

(c) Expansion of Post-secondary Programme

In the 2000 Policy Address, the Government announced the target of raising the percentage of our secondary school leavers who can have access to tertiary education from the current level of 30% to 60% within ten years. As a planning target, we expect the annual intake of post-secondary programmes to increase by 6 000 this year rising to about 30 600 by the year 2010. As these programmes will be self-financed and market-driven, we envisage the emergence of more post-secondary programmes in IT, in response to the increasing demand for IT personnel. Assuming that the ratio of IT studies in these new post-secondary programmes is comparable to, if not higher than, the current ratio of 13%, there will be an additional supply of 600 to 3 900 IT personnel at higher diploma level each year in the next few years.

Most if not all new post-secondary programmes seek to equip students with a solid foundation of generic skills including IT competency so that students can rise to the challenges in an increasingly IT-based and technology-driven society. With such a solid foundation, students can consolidate their IT skills through continuing education and switch to IT fields in their future careers.

We encourage providers to submit their programmes for accreditation. For full-time accredited courses, the Government will provide grant or loan to the students, as well as loan and land at nominal premium to non-profit-making course providers. To take the lead, the Government has announced the acceptance of the qualification of accredited associate degrees for appointment to civil service posts with general entry requirements set at higher diploma level.

Within this context, the Government welcomes non-local institutions to offer post-secondary courses in Hong Kong. Some non-local universities are already offering part-time non-local degree and professional courses in IT. Some have expressed an interest in offering full-time courses.

The Government has also proposed to launch a pilot scheme to provide financial assistance for students to study abroad in selected disciplines with manpower shortage like IT and creative media. This will widen students' choice, increase their exposure and instil an element of healthy competition in the local tertiary education sector. The Government will identify a list of approved overseas IT programmes. Under the proposal, the means-tested assistance will cover tuition fees up to $60 000 (US$7 700) and living expenses of $30 000 (US$3 800) each year. Students who receive financial assistance under the scheme are required to return to work in Hong Kong after graduation.

The Task Force supports the implementation of the expanded post-secondary programme and the pilot scheme to provide financial assistance for students to study abroad in IT-related disciplines.

(d) Encouraging World-renowned Private IT Training Institutions to Operate in Hong Kong

Most of our local IT talent is trained by the publicly funded institutions, such as universities, VTC, etc. The curricula of these publicly funded training programmes sometimes may not be able to cope fully with the fast changing nature of IT development in the market. The UGC-funded institutions, for instance, obtain their funding on a triennium basis and their course content and enrolment exercise etc. cannot readily be amended to tie in with changing market trends within a triennium.

IT training should where appropriate be industry-led and market driven. One way to address this is to

encourage the private sector to play a more active role. There is already a local IT training industry in Hong Kong. To enhance the sources of supply, we will encourage and facilitate renowned overseas IT training institutions to come and establish operation in Hong Kong and provide training that can readily cope with the changing market trends. This will supplement training opportunities offered by the local training institutions and provide Hong Kong students with exposure to international training methods.

To take this forward, we have been actively exploring such possibilities with some renowned overseas training institutions. Such institutions can either establish partnership with local institutions or set up their own operation here. One of these institutions which has expressed interest in operating here is the National Institute of Information Technology (NIIT)[2] of India. **The Task Force recommends** that the Government should actively approach these institutions and encourage them to establish operation in Hong Kong.

(e) Professional Talent at Cyberport

The Cyberport is an information infrastructure currently under development which will put Hong Kong firmly on the global IT map. The project is progressing well and is scheduled for completion in phases between 2002 and 2003. It will provide about 110 000 m² of office space for quality companies specializing in applications of IT, information services and multimedia content creation, supported by a state-of-the-art telecommunications infrastructure and a wide range of advanced facilities and services. The Cyberport will bring together new capital, facilities and talent.

Apart from attracting and retaining professionals, the Cyberport will also be a place to nurture talent. The Government is in discussion with the prospective Cyberport tenants (IT companies), universities in Hong Kong and elsewhere, and other interested organisations in developing an academic plan which matches the objective of having the Cyberport as an infrastructure to create a strategic cluster of quality companies. We have issued an open invitation for proposals on the academic plan which will comprise a range of programmes based on a market driven model through which IT companies will work in partnership with the universities within or outside Hong Kong. We are also pursuing in parallel a Cyberport internship programme whereby students in the universities within or outside Hong Kong will be able to work in the IT companies operating at the Cyberport or elsewhere in Hong Kong. These initiatives should help groom talent to support the many IT developments and related businesses in Hong Kong. **The Task Force supports** the implementation of the academic plan in the Cyberport.

(f) Accreditation of IT Skills Below Degree Level

Accreditation of IT skills is valuable in that it gives a useful indication of a person's skill level for employment purpose or further studies. IT managers can ascertain that their employees possess a minimum level of IT competency, and internationally recognized certification is a global passport for IT professionals to work anywhere in the world.

In Hong Kong, there is already a well-established accreditation system for graduate-level IT courses. We will actively establish similar arrangements for IT courses below degree level. The management of the assessment and recognition system requires a wealth of expertise in understanding different IT skills in the industry, and the ability to align these skills with actual job requirements and market needs. The VTC has established the IT Skills Assessment Centre (ITSAC) to provide recognized skills assessment for IT users including employees of SMEs and IT practitioners. The ITSAC aims to provide a progression

[2] Established in 1981, the NIIT today has a global presence (1 750 centres in 26 countries, including Shanghai in China), with an alumnus base of over 1 million students. NIIT graduates are well-recognised in many IT advanced economies all over the world. The NIIT has established training alliances with leading IT companies such as Microsoft, Oracle, Computer Associates, etc. This type of partnership ensures not only that the course content is always kept up-to-date to cater for changing market needs, but also that the students are recognized and readily recruited by these leading IT companies.

ladder to the IT workforce, as well as recognition in the form of certification of IT skills competence acquired from sources other than through formal education.

The ITSAC has developed skill-based, hands-on assessments in personal computer skill area to certify IT competency levels. Assessment tests for ITAT and other skill areas like web development have also been launched. Support from, and partnership with, other public bodies would also be fostered. Collaboration with the IT Training Quality and Certification Institute Limited (ITTQC), which is supported by the Hong Kong Computer Society (HKCS), will also be explored.

International Computer Driving Licence

The Hong Kong Computer Society has developed the International Computer Driving Licence (ICDL) programme that was launched in May 2001. The ICDL programme provides an international standard of IT competency, certifying that the licence-holder has a basic knowledge of IT and is able to use a personal computer for common computer applications at a basic level of competence.

The implementation of these assessment and accreditation initiatives will help provide objective benchmarks for IT skills below degree level which will, in turn, help identify people with basic IT skills so as to facilitate them for engagement in IT-related work **The Task Force supports** these initiatives to accredit IT skills below degree level.

(g) Attract Local and Mainland Talent Overseas to Work in Hong Kong

Many Hong Kong and Mainland IT professionals work overseas. A lot of local and Mainland students also study IT at overseas institutions. They are a valuable source of IT manpower, with overseas exposure and a broader outlook. We will devise a structured programme to encourage them to work in Hong Kong. For example, we will leverage our international promotional efforts to attract them, by making use of the network of our Government overseas offices around the world. We will also visit prestigious universities overseas and explain to Hong Kong and Mainland students taking IT courses there the rapid and promising development of the information economy in Hong Kong, e.g. the launch of the Cyberport project, and encourage them to work in Hong Kong. **The Task Force supports** the implementation of a structured programme to attract Hong Kong and Mainland IT talent overseas to work here.

B. Nurture our Young Talent

We must improve not only the quantity but also the quality of our students. It is important that students are empowered with skills that can support the continuous growth of our information economy. While our education system will continue to nurture new generations, it is important to introduce value-added elements to supplement the conventional curriculum. We will introduce the following measures to instil valuable qualities such as innovation, language ability, IT competence, all within a framework that also embraces an international outlook :

(a) Exchange/Internship Programme

To ensure that the future generations are equipped to support our economic development in the competitive environment of the international arena, we must provide more opportunities to expose both our IT personnel and students to the digital world at large through exchange/internship programme.

Professionals in the IT field, in particular, require a high degree of international exposure as the digital world is becoming a global village increasingly connected by the Internet network. As our business clientele becomes more global and multi-national, there will be a growing need for our IT professionals

to develop a broader and more international outlook. More local students and professionals should be provided with the opportunities to take part in internship or exchange programme with prestigious overseas IT training institutions and companies. There is no better way to improve one's standard of English than through immersion. Apart from acquiring IT skills, we believe overseas exposure also helps young students and professionals to upgrade their use of English as the international business as well as most popular Internet language.

We will explore with the industry, professional organisations and local institutions to arrange exchange/internship programmes focusing on IT. Our plan is to line up overseas training institutions or IT companies to provide residential IT courses or training for Hong Kong students and IT personnel. The industry/professional organisations will help identify the overseas institutions, liaise with them on the course/training programme, recruit local participants, and arrange exchange/attendance logistics.

Applying the same principle and concept, the student exchange programme currently undertaken by our tertiary institutions should also be intensified and, where appropriate, place the emphasis on IT. The exchange programme will benefit not only local students going overseas, but also bring overseas students to Hong Kong, thus nurturing a multi-national environment in our local institutions. It will also help improve the English language capability of the participants. We will seek industry's support in enhancing student exchange and internship programmes in the local institutions. Examples of some programmes already in place include :

- The "HKU Worldwide Exchange" programme (sponsored by private donations) currently provides opportunities each year for 60 – 70 students to undertake one-semester to one-year studies overseas, and also for some 700 students to attend summer studies and internship programmes in the Mainland.
- The University of Hong Kong is a member of Universities 21 (U21), which is a consortium of 18 international research-intensive universities in the UK, Australia, New Zealand, Singapore, China, Europe and North America. U21 is negotiating with leading international corporations in different parts of the world a scheme which would combine student exchanges and internships. Students of member institutions will be able to study in U21 institutions outside their own countries as exchange students, and at the same time participate in internship schemes with renowned international companies in overseas countries.
- The Chinese University of Hong Kong is collaborating with the Stanford Society of Asian Engineers for short attachments and exchanges to broaden the horizon of its students.
- The Lingnan's Student International Exchange Programme provides opportunities for all Lingnan University's students to go abroad to study, and for overseas students to come and study in Lingnan University.

The Task Force recommends that the Government, the industry and academic institutions should work together to provide exchange/internship programme focusing on IT.

(b) Professional Training for Secondary Students

IT is increasingly becoming a generic skill in basic education. The 5-year strategy "Information Technology for Learning in a New Era" has aroused interest among schools to focus on IT in education. Many schools have taken the initiative to apply for funding from the Quality Education Fund to further strengthen the use of IT in education in their own institutions.

IT is developing very rapidly, and the most up-to-date knowledge of IT normally comes from the marketplace. It follows that the private sector should play a more active role in providing IT training to our students. In the US, private sector involvement is important in addressing the IT manpower shortage problem. For example, the 'Networking Academy' programme of Cisco trains teachers in computing skills and students who pass Cisco training receive an entry level certificate in networking which enables them to enter the industry straight after high school.

In Hong Kong, some pioneering schools have already introduced private vendor training to their teachers and students. For example, Pui Ching Middle School and ten other local secondary schools have obtained funding from the Quality Education Fund to run the Inter-school Internet and Intranet Supporting Project (iiiSP). This is a collaborative and pilot scheme with Cisco to train teachers and students to manage the computer networks in their own schools. Training for teachers is provided by Cisco. The "Train the trainer" approach is used and the trained teachers provide training to their students. Already 80 teachers and 180 students have taken part in the project, which also leads to opportunities for the participants to obtain professional IT qualification from Cisco which is recognized internationally.

While the original objective of the iiiSP is to develop in-house system expertise to support IT activities in schools, the model could be further expanded to engage other world-renowned IT companies to provide professional IT training to secondary students so that the students can gain early exposure in the use of IT. These training programmes can lead to internationally recognised professional qualifications, and will help the students acquire state-of-the-art IT skills. This progression will give participants a competitive edge when establishing careers in the IT field or when pursuing further studies in IT. We are mindful that such programmes should not increase the workload of either teachers or students under their normal curricula. As a start, participating schools would pursue this initiative as extra-curricular activities for teachers and students.

To take this forward, the Government has collaborated with multi-national IT companies to launch the programme this summer. We have already secured the support of Microsoft, Sun Microsystems and Hewlett Packard. Under the programme, the participating IT companies will adopt the "Train the trainer" approach and first provide free training to teachers nominated by participating schools. During the summer vacation, the trained teachers will provide training to participating students in their own schools. Participating schools are only required to provide computer facilities and the venue for training and to adopt the programme as an extra-curricular activity in summer.

We are rolling out the scheme on a pilot basis this summer. About 90 schools, 200 teachers and 5 000 students will benefit from the scheme initially.

In addition to providing IT professional training for secondary students, we will also provide financial assistance to secondary 5-7 school leavers to take courses in practical IT skills most commonly required by employers that are offered by local private IT training providers, tertiary institutions or other educational institutions. This will enhance the employability of these school leavers. Participants in the scheme can obtain reimbursement if they complete the courses, pass the examinations and find jobs which can make use of the IT skills acquired. We will reimburse on a matching basis a major portion of the corresponding course and examination fees.

We will roll out a pilot scheme this summer and will deploy $5 million (over US$640 000) to benefit at least 500 secondary school leavers.

Separately, we will launch another pilot scheme this summer in co-operation with the industry i.e. Pacific Century Cyberworks, Compaq Computer, Adobe and Avaya. The aim is to organise IT summer camps and introduce to teenagers (aged 15-18) fundamental concepts and skills of IT as well as knowledge in telecommunications through campus learning, hands-on workshops, demonstrations and industry visits. This scheme will benefit 240 teenagers this summer.

The provision of early IT professional training to secondary students will help upgrade their IT skills, encourage them to pursue future studies in the IT field, and facilitate them to engage in IT–related work if they wish to enter the workforce. **The Task Force recommends** that Government should collaborate with the industry to provide more professional IT training for secondary students.

C. Longer Term Measures to be Explored with Tertiary Institutions and Other Related Bodies

(a) Enhancing Output and IT Content

Tertiary institutions in Hong Kong will remain the main source of local IT professionals at degree level and above. We appreciate the need of the tertiary institutions to maintain the standard and quality of their graduates, their resource constraints, and their limitations in changing curricula or substantially increasing the number of graduates in certain disciplines without unduly affecting other disciplines. Despite this, our tertiary institutions have been responding positively to market demand to introduce more IT programmes, whether through public funding or self-financing. For example, the City University of Hong Kong will establish a new Department of Computer Engineering and Information Technology in the Faculty of Science and Technology. Student admission will commence in 2002-03. The University of Hong Kong will introduce new programmes on Bioinformatics as well as Information Technology Law from 2001-02. Lingnan University's Information Systems stream has also increased its quota in response to strong student demand. **The Task Force recommends** that our tertiary institutions should explore ways to increase the number of places for IT-related studies at postgraduate, undergraduate and sub-degree levels in the longer term, through redeployment of existing resources or acquisition of new resources, in order to respond to market demand.

We also encourage our universities to enhance IT content in both IT and non-IT related curricula so that students of all disciplines will graduate with basic IT competence. It is noteworthy that many have responded positively. The University of Hong Kong, for example, now requires all its students to have basic IT knowledge. The successful completion of an IT proficiency test is a requirement for graduation for all undergraduate students. The Chinese University of Hong Kong also requires all students, irrespective of level and major subjects, to pass an IT proficiency test in the first year of attendance. Lingnan University has also introduced an IT minor programme for non-IT students. **The Task Force recommends** that the universities should continue with the momentum to enhance IT content in both IT and non-IT related curricula.

(b) Promote and Accept Credit Transfer/Exemption

There are other means to enhance the output of tertiary level IT graduates. One way is to widely promote and accept credit transfer/exemption and recognition of accredited qualifications arising from training provided by other institutions as well as through the expanded post-secondary programme. Tertiary institutions can admit students with IT training at associate degree level to the second year curriculum of undergraduate courses. This approach will encourage those at higher diploma or associate degree level to upgrade themselves and obtain degree qualification in IT and related disciplines within a shorter period

of time. For example, the Hong Kong Baptist University admits students with higher diploma in IT and related courses and grants them credit exemption for up to one year.

To enhance the capability of our IT professionals, the universities can also introduce double degree programme whereby an IT graduate could further obtain another degree, e.g. business management, upon graduation. This will substantially increase their employability. For example, the University of Hong Kong has introduced joint degrees in IT and business so that graduates can competently apply IT skills in business environments.

The Task Force recommends that the universities should strengthen their initiatives to promote and accept credit transfer/exemption in IT-related disciplines.

(c) Setting Up Corporate Schools with the Industry

As evidenced from the experience of other places which are advanced in IT manpower training, such as the US and India, the supply of skilled IT manpower is basically market driven and provided by the industry itself. Training provided by the industry direct or through establishing partnership between educational institutions and the industry can ensure that the content of the training courses is up-to-date and of a standard acceptable to the market. The industry has first-hand knowledge of future trends in IT, and is therefore able to provide valuable input to curriculum development, course design, etc. These are critical elements that ensure the quality of our IT graduates meets with market demand. Some of our universities have set up training partnership with the industry, e.g. the Authorized Academic Java Campus in the University of Hong Kong, and IBM forming a partnership with the University of Hong Kong to establish an E-Business Technology Institute. These initiatives form a good foundation for further development into formal corporate schools. The same applies to the Hong Kong University of Science and Technology, which has collaborated with the industry and has established centres for e-commerce, wireless IT, multi-media research, etc. We need more programmes of this nature to provide more market-sensitive training opportunities to meet the demand for IT manpower in the coming years. **The Task Force strongly encourages** local tertiary institutions to strengthen their collaborative efforts with the IT industry and to set up dedicated training programmes or corporate schools to enhance the provision of IT training at tertiary level.

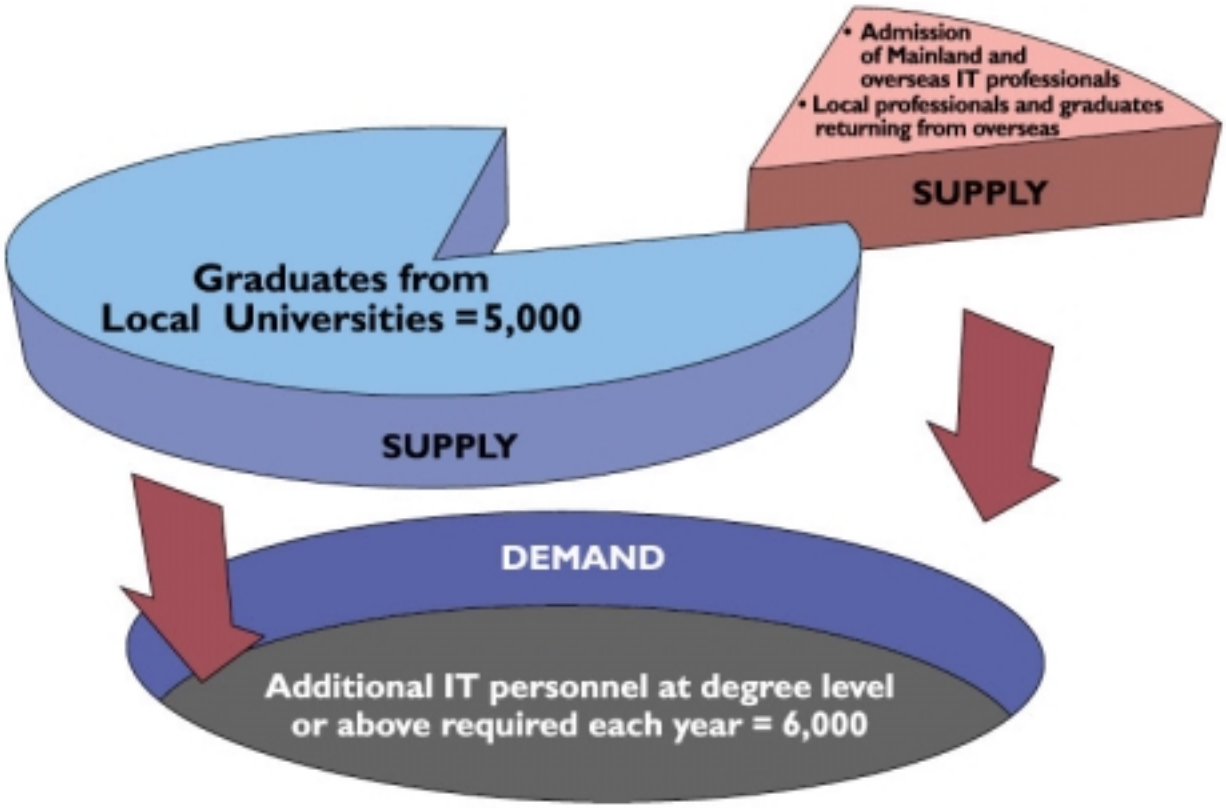
(d) Community IT College

We will facilitate tertiary institutions, private enterprises and other organisations to provide training options other than the traditional sixth form education, such as professional diploma courses, associate degrees, etc. We will encourage them to set up community college establishments. We will explore the feasibility of establishing a community college specialising in IT/software technology institute for secondary school graduates to meet the market demand for IT manpower below degree level. **The Task Force recommends** that the Government should explore this feasibility.

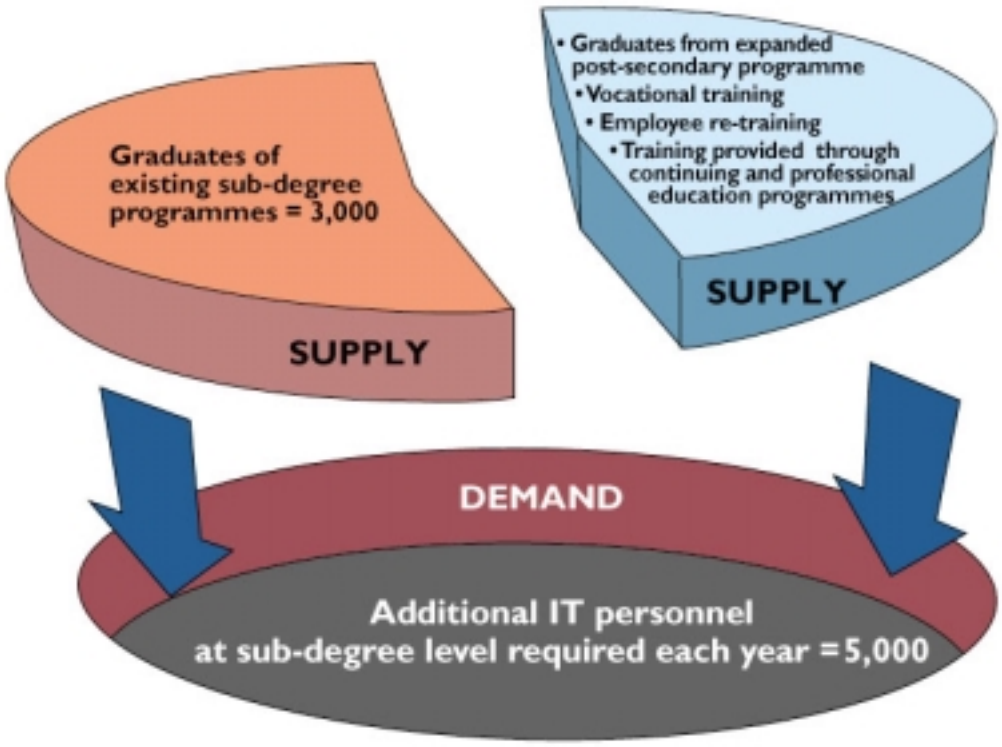
Chapter 6 – Demand vs Supply

We have forecast that Hong Kong needs 8 000 – 11 000 IT personnel each year in the coming years to meet the demand in the market. Taking the high end estimate of 11 000 and assuming that 55% should be at degree level or above as estimated in the VTC Manpower Survey Report, we need each year the additional supply of over 6 000 IT personnel at degree level or above, and around 5 000 IT personnel below degree level.

For IT graduates at degree level or above, the bulk of the demand each year will be met by graduates of local universities (around 5 000 a year). The balance is expected to be met by admission of Mainland and overseas IT professionals, local IT graduates and professionals returning from overseas, and other sources.



For IT personnel below degree level, the bulk will be met by graduates from the current sub-degree programmes (about 3 000 each year) and the coming expansion of the post-secondary programme. The balance is expected to be met through vocational training, employee re-training, and training provided through continuing and professional education programmes of publicly-funded bodies, local private training institutions or overseas institutions operating in Hong Kong.



With the implementation of the various measures examined by the Task Force in this Report, the supply of quality IT manpower in Hong Kong should meet the market demand in the coming years, and thus help sustain Hong Kong's development as a leading digital city.

Chapter 7 - Conclusion

The provision of quality IT manpower is a major element in our Digital 21 IT Strategy to drive Hong Kong's development as a leading digital city. The Task Force considers the implementation of the immediate and longer term measures outlined in this Report crucial to help strengthen IT manpower supply for sustaining our development in the global information economy. A summary of these measures is set out below :

- Implement the scheme to admit Mainland IT professionals.
- Streamline the admission regime for overseas IT professionals.
- Expand post-secondary programme.
- Encourage world-renowned private IT training institutions to operate in Hong Kong.
- Implement an academic plan in the Cyberport to develop professional IT talent.
- Accredit IT skills below degree level.
- Encourage Hong Kong and Mainland talent overseas to work here.
- Intensify exchange/internship programme with emphasis on IT.
- Collaborate with the industry to provide professional IT training for secondary students.
- Enhance output of university graduates in IT and related disciplines and increase IT content of both IT and non-IT disciplines.
- Promote and accept credit transfer/exemption in universities for IT-related disciplines.
- Set up corporate schools in IT field in collaboration with the industry.
- Explore the feasibility of establishing a community IT college.

It must, however, be stressed that Government's efforts alone will not be sufficient to put all these measures in place. We have to work hand in hand with the educational institutions, industry support bodies, the IT industry, employers and the community. With our concerted efforts, we will build our IT workforce for the information economy.

The demand and supply of IT manpower is a dynamic issue. We will closely monitor the implementation of the measures recommended and review their effects. We also welcome comments on these measures and suggestions on other ways to enhance IT manpower supply in Hong Kong. We can be reached as follows :

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- END -

Annex A

INFORMATION INFRASTRUCTURE ADVISORY COMMITTEE
Task Force on IT Manpower

Membership List

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Vocational Training Council

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Mr Raymond Young
Deputy Secretary for Education and Manpower

Mr Wallace Lau (*Secretary*)
Assistant Secretary for Information Technology and Broadcasting

Annex B

Estimated Intake of IT Programmes of Universities Funded by the University Grants Committee

Estimated Intake	2001	2002	2003
Postgraduate	555	575	580
Undergraduate	2 000	1 990	1 985
(a) City University of Hong Kong	545	545	545
(b) Hong Kong Baptist University	145	145	145
(c) Chinese University of Hong Kong	400	395	390
(d) Hong Kong Polytechnic University	310	310	310
(e) Hong Kong University of Science and Technology	320	320	320
(f) University of Hong Kong	280	275	275
Total	**2 555**	**2 565**	**2 565**

Annex C

UGC-funded and Self-financed
Postgraduate and Undergraduate IT Programmes

A. UGC-funded IT Programmes

(a) Undergraduate courses

1) City University of Hong Kong

BA Creative Media
BBA Accountancy & Management Information System
BBA Electronic Commerce
BBA Information Systems
BEng Computing Engineering
BSc Information Technology
BSc Computer Studies
BSc Computer Science

2) Chinese University of Hong Kong

BEng Automation & Computer-Aided Engineering
BEng Computer Engineering
BEng Information Engineering
BEng Internet Engineering
BEng Systems Engineering & Engineering Management
BSc Computer Science

3) Hong Kong Baptist University

BBA Information Systems Management Option
BSc Computer Science (Computer Systems)
BSc Computer Studies (Information Systems)
BSocSc Communications – Digital Graphic Communication

4) University of Hong Kong

Bachelor in Creative Media and Technology
Bachelor of Law and Information Technology
BBA (Information Systems) and BEng (Software Engineering)
BEng (Computer Engineering)
BEng (Information Engineering)
BEng (Software Engineering)
BSc Computer Science and Information

5) Hong Kong University of Science and Technology

BEng Computer Engineering
BEng Computer Science
BEng Computer Science & Computer Engineering
BEng Computer Science (Information Engineering)
BEng Electronic Engineering (Information and Communication Engineering)
BSc Mathematics/IT in Education
BBA Information Systems

6) Lingnan University

BBA Information Systems Stream

7) Hong Kong Polytechnic University

BSc Information Technology
BSc Computing & BA (Management)
BEng Electronic and Information Engineering
BA Computing
BSc Internet and Multi-media Technologies

(b) Postgraduate courses

1) City University of Hong Kong

MFA Media Design & Technology
MA Information Systems (Development)
MA Information Systems (Management)
MA Professional Accounting & Information Systems
MSc Computer Science
MSc Electronic & Information Engineering

2) University of Hong Kong

MSc Computer Science
MSc (Eng) Computer in Manufacturing

3) Hong Kong University of Science and Technology

MSc Computer Science
MSc Information Systems Management

4) Hong Kong Polytechnic University

MSc Information Systems

(B) Self-financed IT Programmes

1) Chinese University of Hong Kong

MSc Computer Science and Engineering
MSc Information Engineering
MSc Electronic Commerce – Technologies
MSc Information and Technology Management
MSc Systems Engineering & Engineering Management

2) Hong Kong Baptist University

MSc Scientific Computing

3) City University of Hong Kong

BSc Computer in Education
MA Electronic Business
MSc Computing
MSc Electronic Commerce

4) University of Hong Kong

MSc (Eng) Communications Engineering
MSc (Eng) Computer and Information
MSc (Eng) Electronic Commerce
MSc (Eng) Internet Engineering

5) Hong Kong Polytechnic University

MSc Electronic Commerce
MSc Electronic Commerce (Executive Stream)

Annex D

Examples of Courses Offered by Private Training Institutions

Vendor	Examples of Qualifications	Focus
Cisco	Cisco Certified Network Associate (CCNA) Cisco Certified Network Professional	Network Design, Network Engineering
Microsoft	Microsoft Certified Systems Engineer (MCSE) Microsoft Certified Database Administrator (MCDBA)	Solution development, Internet applications
Sun Microsystems	Sun Certified Programmer for the Java Platform Sun Certified Network Administrator	Java programming, Networking
Oracle	Oracle Certified Professional (OCP) – Application Developer Oracle Certified Professional (OCP) – Database Administrator (DBA)	Database, Solution development
IBM	IBM Certified Developer IBM Certified Advanced Technical Expert	Solution architecture, Application development

Annex E

Manpower Requirements of IT Personnel by Industry Sector (1999 and 2005)

Industry sector	1999 (estimated)	2005 (projected)	Increase in manpower requirements (1999 – 2005)
Manufacturing	2 300	3 000	+700
Electricity, gas and water	500	600	+100
Construction	700	1 300	+600
Wholesale, retail and import/export trades, restaurants and hotels	12 900	29 500	+16 600
Transport, storage and communications	5 500	9 100	+3 600
Financing, insurance, real estate and business services	22 100	40 000	+17 900
Community, social and personal services	6 100	14 600	+8 500
All of the above	**50 100**	**98 100**	**+48 000**

Note : Figures in 1999 are estimated on the basis of the projected average annual growth rate between 1998 and 2005 provided in the 1999-based Employment Projections concerning the IT personnel required for different industry sectors in 2005 prepared by the Census and Statistics Department.

Annex F

Schemes Adopted by Other Places for Admission of IT Professionals

Country	Sponsorship/application requirements	Labour market testing	Skills assessment/ qualifications required	Visa validity/ period of sponsorship	Work rights for spouses	Health check	Processing time
Australia	Employer sponsorship required indicating number of workers required and agreement to undertakings. Sponsorship status approved for 1 or 2 years (renewable). Nomination required for each worker indicating key or non-key position. Visa application required.	Not required for 'key' activities executives, managers, specialists professionals, intra-company transfers and trainees, MODL[1] occupations.	Evidence of qualifications and/or experience may be required. Formal qualifications not necessarily required.	Up to 4 years Unlimited further stays of up to 4 years at a time.	Yes	Health declaration X-ray only for 12 months or more. Full medical checks required if work is in health care, food industry, or in a classroom environment.	Average 3 weeks low rise cases. Pre-qualified business sponsored 'key' person may be processed in less than 2 weeks.
USA (programme capped)	30 day notification to union/workplace required and approval by government employment agency prior to lodgement of sponsorship application. Compliance with undertakings including notification of any future strike action. Visa application required.	Not required	Evidence of degree or higher required	Up to 3 years. Renew once for 3 years.	No	Not required	Several weeks to month
Canada	Canada has introduced a pilot project to facilitate visa processing for IT workers. Employer application and supporting documentation from government agencies relevant to employer activities required. Monthly levy may be payable by employer.	Not required for professional positions but employer must make case for importation.	Evidence of qualifications and resume required. Sponsored employees must be aged 18-45 years.	Varies depending on position to be filled maximum up to 10 years.	No	Declaration of health required.	2 weeks
Malaysia	'Offer of Employment' application and fee required for validation and agreement to undertakings for each worker. Prior approval from government employment agency required. Visa application required.	Required or exemption must be sought for specified occupations. Under IT pilot project, job-specific validation is not required.	Evidence of acceptable qualification required.	Up to 3 years. Renewable for an unspecified number of years (period of contract).	No, however there is a pilot programme which allows spouses with occupations in shortage to work with no validation required.	No, unless working in the area of health care or work that involves contact with children.	4 weeks
Singapore (industry sector ceilings operate)	Company sponsors application for 'Employment Pass'. Annual levy may be payable by employer in respect of each foreign worker.	Not required but skills shortage must be recognised.	Evidence required of acceptable qualifications.	From 1-3 years; with extension to a maximum of 5 years' stay.	No	Health declaration	Up to 4 weeks
United Kingdom	Employer must make a full application for a work permit for each position to be filled.	Required for Tier 2[2] and Keyworker[3] category positions, but not for Tier 1[4] category positions, intra-company transfers, board level positions, position which are part of substantial inward investments, and occupations on the Shortage Occupations List.	Evidence of qualifications and experience normally required.	Under new arrangements work permits are valid for up to 5 years.	Yes, as long as there are no restrictions in their passport (usually where period of stay in the UK is for less than 6 months).	Not required	2-8 weeks (average of 4 weeks)

[1] Migrations Occupations in Demand List (MODL): List of skilled occupations across Australia that have shortages of suitably qualified people.

[2] Tier 2 categories include positions that required a high level of skill but are not covered under Tier 1 categories (defined below).

[3] Keyworker categories include positions that do not meet the high-level skill criteria but need specialised skills, knowledge or experience.

[4] Tier 1 categories include intra-company transfers, board level positions, and position which are part of substantial inward investments, and occupations on the Shortage Occupations List.

Country	Sponsorship/application requirements	Labour market testing	Skills assessment/ qualifications required	Visa validity/ period of sponsorship	Work rights for spouses	Health check	Processing time
Germany[5] (ICT industry)	1. Application for a work permit required from employer, lodged at the Department of Labour and Social Affairs (DLSA). 2. The DLSA provides a 'Notice of Intention to Grant a Work Permit' (NIGWP) to the employer, who sends it to the employee overseas. 3. Employees shows the NIGWP to German Embassy in his/her country and obtains an Entry Visa for Germany. 4. Employee can commence work immediately on the strength of the NIGWP. Employee must apply for both formal Work Permit at DLSA and a residence permit (for the applicable period) from the local Office of Inhabitants.	Applications for a NIGWP are 'tested' against an electronic posting board which contains the names of employers seeking staff and employees seeking work. Shortages are determined by comparing the numbers of employers and employees, to ensure that there are no EU nationals able to fill the job.	Evidence of degree or equivalent in any IT discipline or agreed salary must be in excess of DM100,000 p.a.	Up to 3 years, with a possible extension to a maximum period of 5 years	Yes, 2 years after spouse's arrival in Germany.	Not required. However, all employees have compulsory medical insurance, with the cost shared equally by employee and employer.	Normally within 1-2 weeks for IT Specialists from non-EU countries

[5] Germany introduced a Green Card in August 2000 which provided 10,000 initial places for non-EUIT experts, with the prospect of 10,000 additional places.