

**Survey Research on e-Learning
in Asian Countries - Fiscal Year 2002
(Country Specific Report - Singapore)**

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1. Market: Market Trends of e-Learning

1.1 Status of IT Promotion (Centered on the Internet)

1.1.1 Outline of the Internet

The government of Singapore addresses itself to various IT strategies, aiming to become a hub in Asia by way of transition to knowledge-based industry structure and of invitation of multi-national enterprises. Domestic infrastructures are highly developed. Internet connection is available in almost any household, with its penetration rate per population (4,018,000 population as of year 2000) being on the top level in the world.

Statistics announced by Infocomm Development Authority (IDA) in 2002 show that the Internet penetration rate has increased by 10 times during six years, from 4.6% in January 1997 to 48.0% in December 2002. Because of the government policy of liberalization of communications started from the end of 1999, which caused free Internet services to increase dramatically, the Internet users increased by 1.6 times (from 583,000 to 956,000) during one month from December 1999 in which those services were started, to January next year. By February 2000, users increased by 2.9 times (from 583,000 to 1,692,000). Personal computers are installed in almost all schools and libraries, as well as community centers and community clubs, making it possible to use the Internet outside of homes or offices. In addition, since the number of mobile phone users has increased to more than 77% of the population (as of December 2002), the actual Internet penetration rate might be higher than the above-mentioned percentage, if the number of Internet users using those mobile phones is included.

In spite of such a rapid growth of Internet usage, domestic digital divide (disparity in information) is still a serious concern. IDA research results show that 53% of the Singapore population have no experience in computers. In this respect, especially people the aged, low educated, or from low income class are said to show a higher percentage. On the other hand, the same results also show that many of those who have good experience in computers are from educated, young, English-speaking, and from high income class.

The government is, therefore, trying to improve IT literacy across the nation, by providing low income households with free recycled computers or free mobile personal computer courses (IT-COACH), as well as by launching "National IT Literacy Programme (NITLP)" in June 2001. The "NITLP" is an e-Learning program, run by IDA, which enables people to acquire basic computer knowledge and Internet skills. The government plans to provide IT technique courses to 350,000 people for the period of three years starting from 2001, especially targeting at laborers, housewives, and aged people, with a budget of 30 million Singapore dollars.

1.1.2 Outline of ISP

As of August 2001, 42 ISPs have joined in the Internet market of Singapore.

Singapore's Internet connections had been monopolized by SigNet until 1995. However, as a result of governmental enforcement of communication liberalization, the market came to be shared by three companies; SigNet, Pacific Internet, and Cyberway. This status continued until 1998. Subsequently, the number of ISPs soared according to deregulations in September 1999, in which the foreign equity limits were lifted, and further liberalization in April 2000, which resulted in the removal of the initial authorization fee.

Broadband connections began to spread among households around 2001. In response to this situation, IDA announced quality standards regarding broadband accesses in October 2001.

According to the survey result announced by IDA in April 2002, the number of broadband users is 957,800, which account for 34%, one in three Singapore residents aged 10 years and above. The most popular method is ADSL (40%), which is generally used in homes or offices. The most popular applications include e-mail (96%) or information retrieval and search (86%), while about 15% of users make use of online banking or online shopping. Among broadband users, 6% of them answered that they frequently use online videoconference systems, while also 6% answered that they use online learning tools.

1.2 Status of Education and Training System

1.2.1 Higher Education

Higher education institutions in Singapore include universities and colleges, polytechnics, Institute of Technical Education (ITE), National Institute of Education (NIE), Open University Diploma Programme (OUDP), etc. To reinforce IT related education, more than 20 higher education institutions are currently providing 75 or more courses, whose objectives range widely from the acquisition of practical basic techniques to the study of leading technologies. The results of the survey conducted by IDA in late 1999 show that 52% of IT industry workers have a Bachelor's degree as their highest educational qualification, while 14% have a Master's degree, 0.2% a Ph.D. About 30% are polytechnic diploma holders.

Singapore has three universities; National University of Singapore (NUS), Nanyang Technological University (NTU), and Singapore Management University (SMU) established in August 2000. The first two universities are national institutions, and SMU is a private university.

Table 1-1 Overview of Universities in Singapore

	NUS	NTU	SMU
Faculty	Seven faculties (Arts and Sciences, Business, Dentistry, Engineering, Law, Medicine, Science) and two schools (Computing, Design and Environment)	Seven schools (Business, Civil engineering, Computer engineering, Information, Electrical and electronic engineering, Materials engineering, Mechanical and production engineering) National Institute of Education	Two schools (Business, Accountancy)
Remarks		NIE is located within the premises.	Opened in August 2000. (Singapore's first private university funded by the government, after the model of the Wharton School of the University of Pennsylvania in the US)

The rate of university graduates among the population was 1 out of 25 in 1990, which increased to 1 out of 10 in 2000. In addition, the governmental expenditure per student has also increased, with approximately 20 percent of the educational budget being allocated for university education purposes.

Characteristics of Singapore's universities lie in the fact that they are operated under the leadership of the government. Especially, large amounts of governmental funds are spent on two national universities, to enable them to provide research results or human resources to satisfy national needs. Each university is ready to build connections with leading educational institutions overseas. The government set a goal to invite at least 10 European or North

American universities and colleges before 2008, and has already been successful in inviting seven. Those leading universities and colleges include INSEAD from France, Johns Hopkins University, The University of Chicago, and Massachusetts Institute of Technology (MIT) from the USA.

NIE is an institution established within NTU, to provide four-year professional courses to train school teachers. They confer the degrees such as Bachelor of Arts (Education), Bachelor of Science (Education), Bachelor of Arts (Physical education), and Bachelor of Science (Physical education). Additionally, they also offer a two-year course for polytechnic graduates, and a one-year course for university graduates. The students are trained to be teachers at primary or secondary schools.

OUDP stands for "Open University Degree Program", which is offered by the Singapore Institute of Management (SIM) under the direction of the Ministry of Education (MOE). OUDP is applying teaching methods that utilize multimedia materials.

1.2.2 Vocational Education

In Singapore, the official job training institutions for those who seek jobs are comprised of polytechnics and Institute of Technical Education (ITE), both of which are under the jurisdiction of MOE. In principle, the training period is three years for polytechnics, and two years for ITE. The equivalent level of ITE may be equivalent to that of industrial high, commercial high, or job training schools, and the level of polytechnic to special vocational schools, if compared to Japanese schools.

Polytechnics are higher education institutions next to universities, whose aim is to train mid-level engineers. A diploma is given to polytechnic graduates.

There are four polytechnics as follows:

- Nanyang Polytechnic
- Ngee Ann Polytechnic
- Temasek Polytechnic
- Singapore Polytechnic

Their courses address engineering, business, mass communication, marketing, graphic, product & interior design, and computer training, while they offer high level lectures focused on real life situations.

Meanwhile, ITE is an educational institution to provide training on techniques and knowledge to those new graduates from secondary schools and adult workers, in order to meet the needs of various industrial fields. Training is offered as a full-time regular program and an apprentice system program to new graduates, and as "Continuing Education and Training (CET) program" to workers. Besides providing job training, ITE also runs "National Technical Certificate System (NTC System)". There are 10 Technical Institutes in Singapore, which are operated by ITE, and are classified as ITE East or ITE West depending on where the campus is located.

Each ITE training schools provides different job training courses, including a full-time course, apprentice (trainee) course, which runs in cooperation with enterprises, and a skill improvement course for workers.

A skill improvement course for workers constitutes a part of "CET Program" operated by the government, and was started to help those workers enhance their skills and knowledge and to provide them with training opportunities. This course contains training for basic knowledge, Industry-Based Training (IBT), and customized skill training, and "Certified OJT Centre (COJTC) Plan" is also included in this course.

IBT approves the companies or training centers of industrial organizations as Approved Training Centres (ATCs), if they satisfy ITE membership qualifications, and then those companies or training centers offer training related to the ITE certifications. In customized skill training, training programs specifically designed for enterprise employees are offered, based on different requirements of enterprises. "COJTC Plan" is a new scheme started from April 1994, whose objectives are to encourage each enterprise to appreciate the importance of training, and to recommend an appropriate OJT.

Basic Education for Skills Training (BEST) refers to basic education for skills training, and Worker Improvement through Secondary Education (WISE) refers to improvement of ability through the education of secondary school level. In either case, the goal is to enhance the ability in English and mathematics to a certain level.

Modular Skill Training (MOST), Training Initiative for Mature Employees (TIME), Adult Cooperative Training Scheme (ACTS) are courses for skill training of adult workers.

MOST was started in 1986, and is now open in the evenings or on weekends as a six-month modular course. TIME is a special training program introduced in 1991, to enhance requirements of job qualification for workers aged 40 or above. Unlike MOST, a language other than English can be chosen to be used in the training course of TIME. TIME also allows trainees to participate in training during the working hours. ACTS is a program to offer fundamental job training for adult laborers having little skills.

1.3 IT Human Resources Required

1.3.1 Outline of IT Human Resources

According to the IDA survey (1999), 93,000 people are employed as IT skill workers in Singapore, whereas approximately 250,000 are expected to be needed before 2010. This figure is 2.5 times the total number of IT skill workers as of 1999. The survey results estimate that the number of ICT workers will increase from 93,000 at the end of 1999 to 114,000 at the end of 2001, which is an increase of 10,000 each year (annual increase of approximately 10-12%). Specifically, the increase is 47% for e-commerce, and 24% for Internet development. About 50% of human resources are those who graduated from domestic higher educational institutions, and the remaining half are foreigners recruited from overseas.

The IDA survey (2002) also shows that the human resource that is engaged in IT industry (IT human resource) in Singapore is approximately 105,600, which accounts for approximately 5% of the total worker population in Singapore. Much of this IT human resource is assigned to Infocomm's sales and marketing departments (17.5%), followed by technical support & help desk (16.7%) and application development & integration (16.6%).

1.3.2 Outline of IT Human Resource Education

Singapore has continuously developed innovative policies with respect to information communication industry since the late 1970s, and addressed itself to education of IT related human resources in accordance with governmental policies.

The primary governmental organizations that are responsible for IT human resources in Singapore include IDA, Ministry of Manpower (MOM), and MOE.

IDA was established by integrating National Computer Bureau (NCB) and Telecommunications Authority of Singapore (TAS) in 1999, and represents now a core organization for Singapore's information communication policies. MOM is an organization to control human resource plans, human resource development, working environments, welfares for workers, and supports for enterprises.

1.4 E-Learning Market Trends

1.4.1 Outline of e-Learning Industry

E-Learning industry in Singapore has been expanding itself supported by governmental policies which involve government, academic and business sectors. The earliest starters of e-Learning are the educational institutions including polytechnics and universities, with enterprises being ready to follow them. Institutions that are highly motivated to implement or provide e-Learning are as follows:

- Nanyang Technological University (NTU)
- National University of Singapore (NUS)
- E-Learning Competency Centre (ECC)
- Polytechnics
- Institute of Technical Education (ITE)
- Institute of Systems Science
- ASKnLearn.com Pte Ltd
- Pacific Knowledge Platform Pte Ltd
- Ednovation

There are approximately 66 e-Learning related companies operating in Singapore, and their activities can be categorized as (1) contents, (2) technology, and (3) services.

Table 1-2 Number of e-Learning Related Companies in Singapore by Specific Fields

Field	Number of companies
(1) Contents	
Course Publisher	28
Portal	12
(2) Technology	
LMS	27
LGMS	32
Synchronous tools	22
Authoring Tools	27
Video-Audio Tools	18
Simulation Tools	7
Collaboration Tools	32
Testing Tools	27
Others	15
(3) Services	
Custom Content	45
Consulting	51
System Integration	40
Other	16

Note: There are duplications in case of companies handling multiple fields.

Source: E-Learning House Website

Major vendors are listed in the table below:

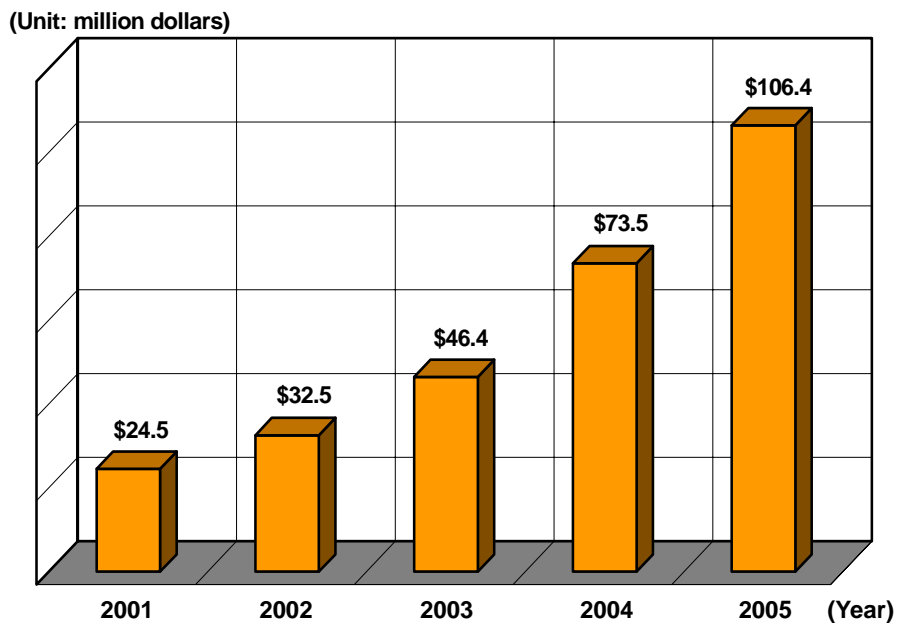
Table 1-3 Major e-Learning Vendors

Field of contents	Field of systems	Field of services
PurpleTrain ISS ASPonline SDCAsia SmartForce NETg	NCS Wizlearn CrimsonLogic Saba Docent IntraLearn	ICUS KnowledgePlatform SCS.TTASia IKS InkStudio HP Education

Source: L. K. Chew (2002.7), a country report submitted to "AEN Conference 2002"

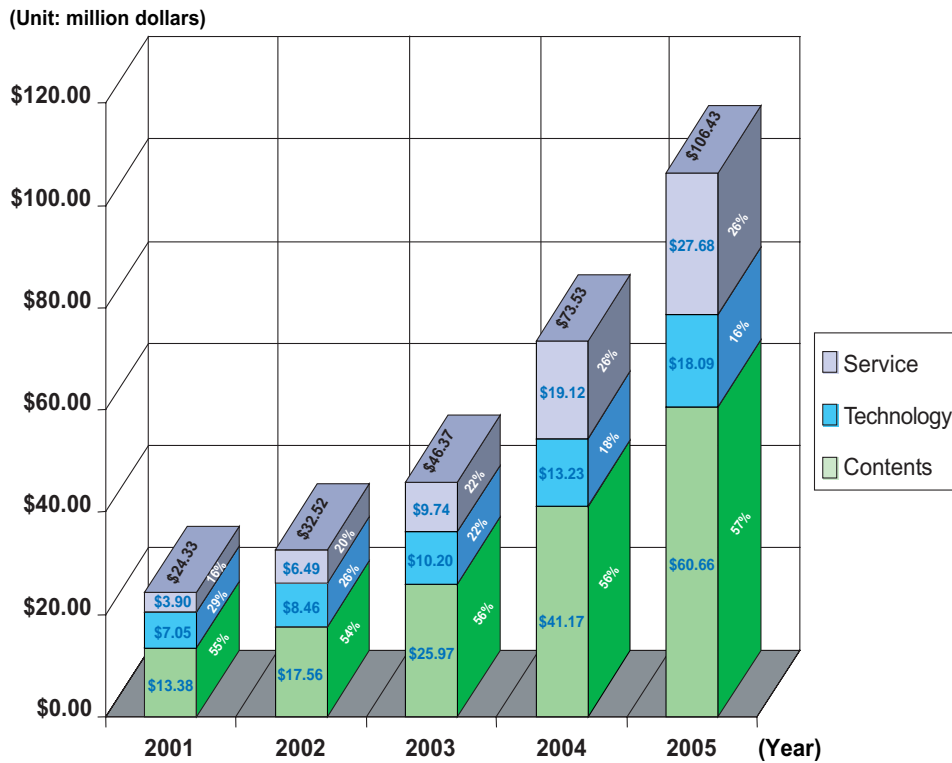
1.4.2 Market Size of e-Learning

The e-Learning market size in Singapore may be determined by the survey results published by IDA in February 2003. According to the survey, the e-Learning market in Singapore is equivalent to approximately 32 million US dollars as of 2002, and expected to grow at an annual increase ratio of 45% and then, to reach approximately 106 million US dollars, slightly more than threefold, in 2005.



Source: IDA (2003.2), *Survey on the e-Learning Market of the region*

Figure 1-1 Trends of e-Learning Market in Singapore



Source: IDA (2003.2) *Survey on the e-Learning Market of the region*

Figure 1-2 E-Learning Market in Singapore by Specific Fields

In view of specific fields, the contents field occupies slightly more than 50%, and the technology field slightly surpasses the service field in 2001, though the service field is anticipated to have grown larger than the technology field in 2005.

The government advocates that "Singapore will be a hub for e-Learning in Southeast Asia", and is greatly interested in e-Learning markets in surrounding countries.

2. Technology: Trends of e-Learning System (Synchronous & Asynchronous)

Cases of e-Learning implementation in Singapore can be found primarily in activities in universities and polytechnics. Implementation by enterprise is said to have just begun.

In the following sections, activities in universities and polytechnics, and then cases of corporate education are shown.

2.1 National University of Singapore (NUS)

<http://www.nus.edu.sg/>

2.1.1 Overview

NUS is the oldest university in Singapore.

NUS is a pioneer of development and usage of e-Learning technology, and is developing e-Learning portal IVLE, distributing it to other educational institutions, and promoting distance training courses in the SMA program.

In NUS, the Center for Instructional Technology (CIT) is responsible for training and IT technology. Facilities related to e-Learning in the campus include CIT/CC Auditorium, Multimedia Development Lab, and SMART Classroom. Synchronous learning technology which is now utilized includes videoconference systems, and asynchronous one includes virtual learning, courseware creation tool IVLE, and network TV applications.

CIT/CC Auditorium and SMART Classroom are the classrooms equipped with videoconference systems and various multimedia apparatus.

2.1.2 Activities Related to e-Learning

(1) Synchronous learning technology and its usage

Since 1992, NUS has been delivering remote lectures using videoconference systems which are capable of bi-directional communication. It is the first experiment in the nation. NUS uses this system to ensure cooperation with both domestic and overseas educational and research institutions, and is currently broadcasting lectures from other institutions, as well as delivering NUS courses.

Two types of videoconference systems are used by NUS: Point-to-Point Videoconferencing and Multipoint Videoconferencing. The former is for conferences connecting two locations, and the latter is for more than three locations from which every attendant can participate in the same videoconference.

Using these facilities, NUS provides lectures linked with domestic and overseas research and educational institutions. For example, there are programs connected with various institutions such as John Hopkins University, the Georgia Institute of Technology, the Eindhoven University of Technology, and the Pace University School of Law, as well as NUS Singapore-MIT Alliance Programme (SMA: details are described later) with MIT.

(2) Asynchronous learning technology and its usage

(a) "Integrated Virtual Learning Environment (IVLE)" and "Open IVLE"

NUS started experimental use of e-Learning technology on HTML-based Web pages in December 1996. This system was named "IVLE" in July 1997, and was further upgraded and released by CIT as version 1.0 in December 1998. The latest version as of the end of 2002 is Ver.7.0.

Currently, in 2,400 courses, 28,000 students are using "IVLE" to take advantage of such features as discussion forums, online chats, and auto-marking tests, and teachers are also using various tools. By using IVLE, the students can view the latest lectures regardless of location and time, and the teachers can add the lecture materials, improve the quality of communication with students, and be more time efficient.

"IVLE" was given e-NOVATOR Awards in September 2000, and made an appearance in e-Learning exhibition "Online Learning Asia" in May 2001. In "ITSC Plugfest 2002" in 2002, it passed three tests, IMS Metadata, IMS Content Packaging, and IMS Question and Test Interoperability, and was awarded a prize.

Furthermore, the configuration utilizing Internet Information Server and Microsoft SQL server 2000 is highly applicable for many purposes, and from Version 3.0, IVLE was made open to the public as "OpenIVLE". Versions 3.0 and 4.0 were released to OpenIVLE Scheme in June 1999. These versions are made available to colleges in the Philippines and others at no cost.

(b) "NUSCast (using both synchronous and asynchronous learning technologies together)"

"NUSCast" is a network TV application operated by CIT, and consists of six channels; BBC, CNN, CNBC, Discovery, Channel News Asia, and NUSLive. It allows them to broadcast educational programs and lectures over the Internet or intranet.

Among the six channels, NUSLive is a channel owned by NUS, and is used to deliver campus events, NUS lectures, and open lectures. Delivered contents include video and audio, while they are also designed to handle presentation materials in PPT format or lecture notes synchronously. All these contents are saved through Multimedia On Demand (MOD), to allow them to be replayed over the Internet or intranet.

2.2 Nanyang Technological University (NTU)

<http://gemsweb.ntu.edu.sg/igems/public.htm>

2.2.1 Overview

NTU was established in 1991 as the nation's second university. Its previous organization was called Nanyang Technological Institute (NTI), established in 1981. NTU has such faculties as accountancy, applied science (computer engineering and material engineering), business, communications, and technology (civil engineering, electric engineering, and mechanical engineering), and it also has graduate schools. There are 16,000 students in these faculties, and 7,000 in graduate schools. NIE moved into the NTU campus at the end of 2000, and provides courses for pedagogy, linguistics, and psychology.

In NTU, Centre for Educational Development (CED) is in charge of e-Learning promotion planning. Under the control of Steering Executive on Electronic Education (SEED), which is CED's superior e-Learning committee, CED is working at planning, operation, and technical support for entire e-Learning systems. It also provides teachers with seminars for usage of e-Learning, and offers support for content creation. Communication infrastructures within the campus are managed by Centre for IT Services (CITS).

2.2.2 Activities Related to e-Learning

(1) Synchronous learning technology and its usage

NTU owns more than one videoconference systems, dedicated classroom, and recording studio.

Similar to NUS, it receives and delivers lectures which are relevant to the distance learning program allied with MIT (SMA).

(2) Asynchronous learning technology and its usage

(a) "edveNTUre"

NTU has been testing WBT systems since 1995, and currently uses Blackboard. This product is a courseware management system from an American corporation, which is used by more than 3,300 organizations worldwide. For configuration of the software

platform, Blackboard 5.5.1 Level 3 with Oracle 8.1.6i is used as a database management system, and Apache as Web server. As for VOD and Web casting services, those from SGI, HP, Microsoft, and Dell are used. However, certain steps will be followed in such a way that Blackboard CourseInfo 4.0 will be employed for contents management and delivery systems, and it will be upgraded to Blackboard 5.5 Level 3 in the following year.

When a decision was made on configuration of e-Learning platform, one year was spent for preparations, before "edveNTUre" was installed in July 2000, at the cost of 1.1 million US dollars. It has enabled 19,000 students including those participating in distance learning, and 3,000 staff to take advantage of e-Learning.

As of the end of March 2001, the courses made available online via "edveNTUre" account for 51% of all NTU courses, and this percentage is reported to have kept increasing.

"edveNTUre" are characterized as follows:

- Customization to attendants' pace
- Group learning outside classrooms
- Online test with auto-marking function, and class management & evaluation tool
- Streaming of digital contents
- Distance learning (distance learning program tied-up with MIT using SMART Classroom)

After installing "edveNTUre", CED has been holding seminars and courses in which their staff can participate, train them on it, and learn how to use it effectively. The program for staff is called "edUtorium", which is also open to participants from other higher educational institutions. Additionally, efforts were made to evolve support systems using e-mail and other materials, resulting in the establishment of "Local Blackboard User Group in Singapore" to help domestic Blackboard user organizations cooperate with each other.

NTU plans to further expand the e-Learning facilities mentioned above.

It will first upgrade the content management and delivery system from Blackboard CourseInfo 4.0 to Blackboard 5.5 Level 3. "edveNTUre" and student information systems will be completely integrated into a single system, and student management jobs will be automated. Thus, when a student logs in to a campus portal site with his/her own ID and password, he/she can access all necessary services.

After installation of "edveNTUre" in July 2000, efforts have been continued to develop technical tools to support teachers who prepare contents or delivery processes, and the following systems are implemented:

- "iNTUition"

"iNTUition" is a synchronous training and learning tool with which you can monitor lectures, meetings, seminars, and sessions run online by teachers.

- "preseNTUr"

"preseNTUr" facilitates creation of video presentations which may be displayed in parallel with PPT slides.

- "aNTUna"

"aNTUna" represents an initiative to promote e-Learning with aids of portable terminals such as PDA, cellular phones, or laptop computers.

- "Respondus"

"Respondus" is a program for creating quizzes and questionnaires containing numerical expressions or scientific symbols.

- "Secure Pack"

"Secure Pack" can be used to store PPT presentations and other materials into a file, preventing other user or viewer from making alterations.

2.3 Singapore Management University (SMU)

<http://www.smu.edu.sg/>

2.3.1 Overview

SMU is the first private university in Singapore, founded in January 2000 and funded by the government. It is modeled after the Wharton School of the University of Pennsylvania in the US. It provides four faculties in the field of social science. There are 800 students in these faculties, and 90 in graduate schools.

Similar to other domestic universities, SMU also expresses its intention to attain an educational environment fully powered by IT technologies. It installs, therefore, wireless communication facilities supplied by National Computer Systems Pte Ltd. (NCS), as well as multimedia applications, e-mail systems available during an entire life-time, and servers to run personal Websites.

SMU and Wharton School entered a five-year agreement to establish a cooperative relationship within the management, business, and financial fields.

2.3.2 Activities Related to e-Learning

"SMUConnect", a system used as an SMU's teaching and learning portal, is created based on CampusConnect 2000 from NCS. SMU's students and staff can use "SMUConnect" to access class lists, lecture plans, discussion forums, notifications, examination records, etc. A web page is created for every lecture, where students or staff can communicate with each other. A plan is under way to use VOD for lectures.

2.4 Singapore-MIT Alliance (SMA)

<http://web.mit.edu/sma/>

2.4.1 Overview

"SMA Program" is a program aiming at cooperation among two universities in Singapore and MIT in the USA in the fields of education and research. The program is financed through the support of the government of Singapore.

2.4.2 Activities Related to e-Learning

SMA is a program using both videoconference systems and WBT, and operated jointly by the above-mentioned three universities. Approximately 200 students are learning using this program.

The SMA program includes five technical courses. The number of teachers participating in this program is 50 from MIT, 50 from NUS and NTU, while the number of students is 100 from MIT, and 100 from NUS and NTU. 8-10 classes are held everyday on the average, and 10-16 subjects are offered during one term.

In principle, SMA classes are held in such environment where simultaneous and bi-directional communications among three universities are enabled, and where students and teachers can attend (thus, the lectures are open, in many cases, late in the evening or early in the morning). Each university has set up classrooms equipped with videoconference systems, allowing students to attend live lectures, communicate with teachers through videoconference systems, and review lectures using electronic educational materials.

A lecture process is started by uploading lecture materials to the course Web site, which are created by teachers and TA. Lecture materials include electronic presentations, lecture notes, quizzes, and notifications. When lectures are delivered from remote learning classrooms located in either of the two Singapore universities, they are automatically digitized and then saved in the Website for the courses. Students make access to the uploaded lecture materials and digitized lectures through their course pages. They can use such things as discussion groups, course calendars, and previous lectures' details. All lectures can be replayed.

2.5 Civil Service College

<http://www.ipamonline.com/>

2.5.1 Overview

Civil Service College is a training facility established for Singapore public servants. There are 120,000 public servants in Singapore, and training hours per person is reported to be 100 hours/year.

2.5.2 Activities Related to e-Learning

This college actively implements e-Learning, and has appointed six staff to take charge of e-Learning, having its 2,000 staff attend training courses for e-Learning.

It opened Open Academy as an e-Learning portal site in July 2001, from which 220 e-Learning courses (4-13 hours) are available to workers belonging to public services. Those organizations which have participated from the early stage of Open Academy include various departments within MOE.

Course vendors include those originating in the USA, such as SmartForce, NETg, and SkillSoft, while some courses are equipped with platforms using synchronous technology.

2.6 Temasek Polytechnic (TP)

<http://www.tp.edu.sg/>

2.6.1 Overview

TP is the third polytechnic in Singapore, established in April 1990. It offers more than 30 full-time diploma courses, and has approximately 15,000 students.

2.6.2 Activities Related to e-Learning

TP has implemented training programs using e-Learning for teachers. The number of teachers is 1,400. On average, a teacher takes 88 hours of lectures per year, and its cost equals 4.7% of the total annual wages paid.

E-Learning programs are as follows:

- Training & Independent Learning (TralL): For staff
- E-Learning support for Teaching Higher Education Certificate (THEC): For lecturer
- Online Certificate in IT for Education (CITE): For lecturer

TralL makes use of SmartForce online courses, and CITE uses Blackboard LMS. The number of staff who make use of the above e-Learning is 363 for TralL (number of registrations), 100 for THEC (number of registrations), 33 for CITE (23 finished and 5 dropped out). The cost for e-Learning training constitutes 3% of the entire training budget.

2.7 NTUC Income

<http://www.income.com.sg/>

2.7.1 Overview

NTUC Income is one of the four major insurance companies in Singapore, and sells mainly union insurances. Number of employees is 800, and there are 4,500 insurance advisors. Annual training hours per employee is 40, while annual training budget is 4% of annual total amount for wages.

2.7.2 Activities Related to e-Learning

E-Learning is applied to employee training, in order to provide comprehensive courses, in diminishing restrictions on time and location. This company has started distributing simple documents (including those describing "how-to") on intranet since 1995, and begun full e-Learning courses starting from October 2001. Currently, one full-time staff is assigned to coordinate e-Learning, to provide courses to 500 employees which corresponds to 62.5% of all employees. The average number of e-Learning hours per staff is 10 each year, while the total number of hours up to the end of June 2002 was 3,500.

Courses provided include procedures to guide staff in their jobs, product knowledge, and preparatory courses for professional examinations. Future directions include implementation of lectures using games or virtual classrooms, development of own courseware, offering of e-Learning courses for 1 million policy holders, and the development of their own LCMS.

In order to encourage employees to use e-Learning, at least one PC for e-Learning is installed in each center, while e-Learning is made available both in office and home, in addition to coordinators or supervisors who monitor usage of e-Learning.

2.8 CityCab

<http://www.citycab.com.sg/>

2.8.1 Overview

CityCab is the second biggest taxi company in Singapore which started business in July 1995, and has 10,000 taxi drivers, 5,000 vehicles, and 180 employees. The training budget has increased by two times compared to the traditional amount, reaching approximately 1 million Singapore dollars.

CityCab is known to be an innovative company, that has introduced high-grade taxis first in Singapore, and has created, at the cost of 20 millions Singapore dollars, "CityNet" which is a taxi dispatch system using satellites.

2.8.2 Activities Related to e-Learning

Corporate education in CityCab is operated using a Website for a Taxi Vocational License (VL) Course that was introduced in July 1999. Before implementing online courses, classroom training courses of 90 hours had been offered for preparation of the license examination, and 2,000 drivers are currently using online courses.

3. Advanced Activities

3.1 Next Generation Learning Infrastructure such as Collaborative Learning

In Singapore, where they are committed to e-Learning in universities, both synchronous and asynchronous types are used at the same time. Collaborative learning comprises a part of this commitment.

For example, in "SMA Program", in order to encourage communication between teachers and students not only during lectures but also in other occasions, most advanced facilities are installed to improve the quality of collaborative learning. NUS is also proceeding with a development plan for a network type collaborative learning environment, called "Collaborative Virtual Interactive Simulations (C-VISions) System".

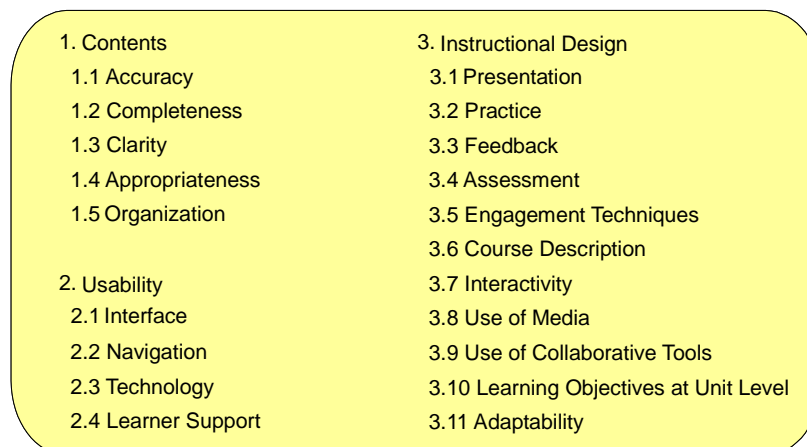
3.2 Quality Standard

E-Learning Competency Centre (ECC) is positively considering implementing quality standards to improve courseware quality, since e-Learning is considered important within education/vocational training. It has already developed "Quality Criteria for e-Learning Courseware" and "Recommended Processes for e-Learning Courseware Development". For more information, refer to the "Quality Evaluation" page of the ECC Web site.

The Quality Control (QC) approach is taken in courseware quality criteria, and the Quality Assurance (QA) approach is used in the criteria for processes of courseware development. These two approaches complement each other, in aiming to help improve the quality of e-Learning courseware.

3.2.1 Quality Criteria for e-Learning Courseware

The quality standard for e-Learning courseware is expected to be a guideline to enable end-users to select appropriate courseware by comparing one with another, as well as to be a guideline to enable vendors to develop e-Learning courseware. The standard is comprised of three elements; contents, usability, and instructional design.

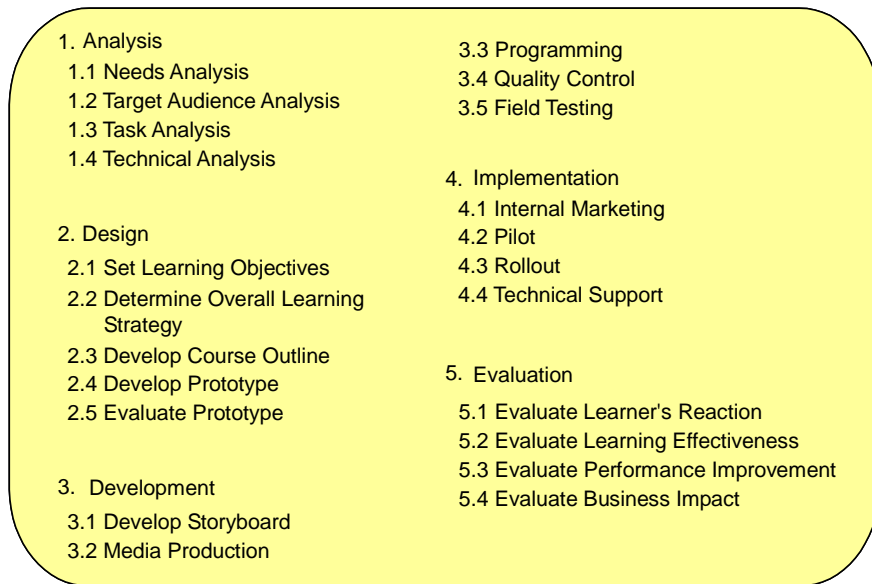


Source: ECC Website

Figure 3-1 Structure of e-Learning Courseware Quality Standard

3.2.2 Recommended Processes for e-Learning Courseware Development

Appraisal criteria for courseware development, which allows for better quality e-Learning courseware to be developed, consists of the following five elements:



Source: ECC Website

Figure 3-2 Elements of Recommended Process for e-Learning Courseware Development

4. Government Policy and its Vision (Mid- and Long-term Direction)

4.1 Status of IT Policies

4.1.1 Overview

IT policies in Singapore have been started from "National Computerization Plan: NCP" announced in 1980, followed by other policies with different goals, which were sequentially unveiled and enforced.

Table 4-1 History of Main IT Related Policies in Singapore

Date	Descriptions
1980	National Computerization Plan
1981	Civil Service Computerization Programme
1986	National IT Plan
October 1992	IT 2000 Plan
June 1996	Singapore-ONE Plan
December 1998	High-speed internet service was started based on "Singapore-ONE Plan".
April 1999	Web site for online administrative service (e-Citizen Centre) was established.
June 1999	Basic plan was announced for "Infocomm 21".
December 1999	IDA (Infocomm Development Authority of Singapore) was implemented.
March 2000	Policy to situate every citizen online.
March 2000	Policy to educate human resources.
April 2000	Policy to promote IT industry.

Source: various documents

Although NCP had a 10-year plan, the "National IT Plan", which was developed in 1986. It was followed by "IT2000: Vision of an Intelligent Island" announced in 1992, to reveal a national concept for IT application. This plan, which aims to apply IT to social life and to allow every citizen to access IT services, has specifically set objectives of (1) making Singapore a global hub, (2) the promotion of economic evolution, (3) the enhancement of personal capability, (4) local and international collaboration between different societies, and (5) the improvement of the quality of daily life.

As a project to achieve these objectives, Singapore-ONE plan was announced in 1996. This plan aimed to connect all households, schools, and public/private facilities through a network of leading technology to enable a large amount of information communication.

Although "IT2000 Plan" announced in 1992 was initially scheduled to finish in 2005, "Infocomm 21" was additionally announced in 1999 because of the necessity for new policy to cope with rapidly advancing information communication in the world.

4.1.2 Policies and its Details

(1) "Information and Communications Technology for the 21st Century (Infocomm 21)"

"Infocomm 21" is a policy to make Singapore the global information communication hub before 2010. Unlike traditional IT policies, this policy confines itself to abstract contents with an intention to indicate strategic frame and orientation for industry that will be updated periodically depending on changes made in technological or economic society.

Its particular objectives are the following three actions:

- To establish an ICT department playing the primary role in economic evolution.
- To employ ICT as a common platform to expand an intellectual-intensive economy.
- To improve personal living quality in the future information society.

The following are six basic strategies to achieve the above objectives:

- To make itself an information communication hub in the Asia Pacific region
- To “dot-com” the private sector
- To “dot-com” the public sector
- To “dot-com” the people sector
- To be a talent capital of information and communication
- To work out policies/regulation for enterprises involved and consumers

The government has announced specific policies based on the above strategies. Each policy, having its own particular objectives, takes into consideration all related factors including the development of industry, enterprise, technology, market, infrastructure, and human resources, the commitment to policies/regulations, the collaboration in leadership, education, and strategy, and international cooperation. Planning and enforcing these policies are not dependent on a single governmental organization, but are conducted jointly by each concerned organization from both government and civil society.

Policies which were specifically implemented under "Infocomm 21" plan are as follows:

Table 4-2 Specific Policies of "Infocomm 21"

Date	Policy	Overview
March 2000	Policy to situate every citizen online.	Policy aiming at offering most recent technology to those people from lower income class or who do not speak English.
March 2000	Policy to educate human resources.	Policy to educate 250,000 of human resources which will be probably required in 2010.
April 2000	Policy to promote IT industry.	Policy to implement synchronous broad area multi-media industry, to help IT industry grow to Singapore's primary developing one.
June 2000	E-government action plan.	Policy to implement IT in governmental services/internal procedures to become a leader of knowledge intensive economy.
June 2000	Policy to convert industry into a dot-com.	Policy to make Singapore a global IT hub. Its aims include establishment of e-business foundation, promotion of implementing IT in industry, stimulation of consumer demands, education of IT human resources, elimination of digital divides, etc.

Source: Created in reference to Web site of NTT Singapore Pte. Ltd.

4.2 E-Learning Related Measures as Part of IT or Educational Policies

4.2.1 Overview

The objective of policies relating to IT in Singapore is to reinforce national competitiveness through improvement of productivity resulting from increased opportunities for employment. Especially, the targets that are aimed at specifically through e-Learning are (1) the development and quality of human resources/technology, (2) the penetration of life-long learning, (3) the promotion of moving to a digital economy, (4) the contribution to growth of service industries, etc.

IDA worked out a five-year strategic plan, "Infocomm 21", for technical fields in April 2000, and considered a practical promotion policy in cooperation with each related organization based on the following five slogans:

- (1) Singapore as premier infocomm hub (development of IT industry)
- (2) Singapore business online (dot-coming the private sector)
- (3) Singapore government online (dot-coming the public sector)
- (4) Singaporeans online (dot-coming the people sector)
- (5) Singapore as infocomm talent capital

Issues most directly related to IT human resources, among the above slogans are, "Singaporeans online" and "Singapore as infocomm talent capital".

As for the former, it is hoped that 70% of students and adults will use information communication technology in daily life before 2002, and that 80% of all the population will have literacy in information communication to become one of the top five information communication nations in the world before 2005.

As for the latter, it is planned that 35% of the working population will have basic knowledge on information communication before 2003, and that 136,000 of human resources will be available. More specifically, under the control of IDA and MOM to promote basic IT education, "National Literacy Programme" is under way, which may be referred to as a national IT literacy education plan. In general perspective, 5 billion Singapore dollars have been funded for the life-long education program, the college and vocational education facilities to be established, and the partnership program between government and civil society to educate people having basic knowledge of information communication and/or to increase the number of information communication human resources as well as to develop their capabilities.

Prior to this, a human resource development strategy, "Manpower 21", was announced by MOM in August 1999. This is a long-term and comprehensive human resource development strategy aiming at realizing an "economy based on knowledge and having superior international competitiveness", which represents the image of Singapore in the 21st century suggested by the Committee On Singapore's Competitiveness.

Six major issues are described below:

- (1) Integration of human resource plans (completing human resource information systems and national human resource council)
- (2) Lifelong learning to ensure lifelong employment (lifelong learning school, national skill certification system, One-Stop Career Centres)
- (3) Completing a talent pool in Singapore (refreshing guidelines for policies on invitation to Singapore and workers from abroad)
- (4) Reforming the working environment (improvement of professionalism in industry relying on Singapore as its foundation and global level practice of human resources)
- (5) Development of energetic human resource industry (establishing global level research and development organizations)
- (6) Partnership (enhancing collaborations among government, employers, and employees)

MOE takes responsibility for human resource training in school education, and has developed a practical policy focusing on the following issues, based on "Masterplan for IT in Education" announced in April 1997:

- (1) To reinforce connections between school and society.
- (2) To implement innovative processes.
- (3) To improve creative thinking, lifelong learning, and awareness for social liability.
- (4) To enhance administration and management of educational systems.

Foreign IT engineers are under intensive demand because domestic IT human resources are not enough in number due to the rapid growth of need for IT human resources. According to "Infocomm Manpower and Skills Survey 1999" announced by IDA, approximately 5,000 engineers are recruited each year. The countries in which engineers originate include Malaysia (51%), India (16%), and China (12%) in descending order.

Contact Singapore (<http://www.contactsingapore.org.sg/>) is one of such typical activities that invite workers from abroad. In this particular activity, information on job offerings from domestic enterprises is released on a Website, to inform details to those who seek jobs in Singapore, including foreign engineers and students as well as Singapore citizens living abroad. This site also accepts applications for job offerings.

These governmental policies have encouraged higher educational organizations to enhance cooperation with foreign counterparts, preventing domestic students from moving out of their home country as well as inviting foreign human resources to Singapore. "SMA Project" is a typical example of such activities. This kind of cooperation allows for more sophisticated and advanced lectures to be offered, resulting in the elimination of necessity for students to learn abroad and the attraction of students from various Asian countries to Singapore.

IDA has established Infocomm Training Framework (ITF) composed of five levels to satisfy the needs for information communication technology training, based on individual levels of public sector, civil sector, and the general public. Programs are organized in such a way that each level is covered, from obtaining of basic computer literacy to acquisition of technology required of information communication human resource.

The following are examples of programs taking advantage of e-Learning:

(1) "Strategic Manpower Conversion Programme (SMCP)"

"SMCP" is a strategic human resource conversion program developed mainly for people with higher educational backgrounds, in accordance with the objective, "to develop manpower as a globally competitive advantage in knowledge economy", defined within "Manpower 21". The MOM's Manpower Development Assistant Scheme (MDAS) fund was used by IDA and MOM to start the program in information communication industry in April 2000, and in the e-Learning field in April 2001.

In "Information SMCP", human resources from non-information communication fields are expected to learn information communication technology, and the government shares course fees for personal training that are useful in joining the information communication industry.

"E-Learning SMCP", on the other hand, has been developed to educate human resources who create e-Learning solutions, in view of the fact that e-Learning has been evolved into an alternative measure for training. Its objective is to first develop guidelines for e-Learning, and then educate 150 creators of e-Learning guidelines to implement them and to satisfy their criteria. The targets are college graduates and those who obtained college degrees having experience in educational fields. Basically, this is intended to be an employee-based program, to allow for subsidy for training courses or bounty for training costs, in case of sending existing staff into training courses when the staff is assigned to a different department, or in case of registering new staff with reshuffle courses.

(2) "National IT Literacy e-Learning Program (e-NITLP)"

"e-NITLP" is an e-Learning program controlled by IDA, which improves living standards or workers' employment conditions by acquiring basic computer knowledge and Internet skills. Under the administration of IDA and MOM, 3 million Singapore dollars will be raised for 350,000 people for three years (this started from 2001). Its target is adults, housewives, and senior citizens, and the time taken for one course is approximately two hours.

(3) "e-Learning Early Adopters Programme (e-LEAP)"

"e-LEAP" is a program developed by IDA, aiming to encourage enterprises to take advantage of e-Learning. This program supports enterprises that implement e-Learning, with respect to the initial implementation costs in accordance with a specific guideline. In principle, up to 50% (upper limit is 100,000 Singapore dollars) of the initial implementation costs are subsidized, which may be spent on consulting fees for implementation, purchasing costs of hardware/software, customization of courseware and e-Learning applications, development costs, contracts with ASP, etc. To apply this program, an enterprise should have officially registered in Singapore, and should create an implementation plan, which conforms to at least one of the following three guiding principles.

- Encourage Adoption of e-Learning as part of the company's training culture.
- Foster Development of Capability of skills related to e-Learning among employees.
- Bestow a Best-Practices approach to support the company's e-Learning strategy and plans.

4.2.2 Policies and its Details

Overview is described focusing on "Masterplan for IT in Education".

(1) "Masterplan for IT in Education"

<http://www1.moe.edu.sg/iteducation/masterplan/welcome.htm>

In Singapore, a program was started aiming at computer literacy to be obtained and computer science to be learned in the 1970s. Initially, it was operated mainly to offer opportunities to make access to computers as extracurricular activities, but gradually moved towards more detailed contents and more comprehensive targets. Between 1995 and 1997, MOE created experimental initiative to implement ICT technology into an educational scene. Three major initiatives are as follows:

(a) "Accelerating the Use of IT in Primary Schools (AITP)

Program to promote utilization of computers through all curriculums.

(b) "Student's and Teacher's Workbench (STW)

Program to promote integration of multimedia resources.

(c) "JNet projects"

Program to find internet-based education methods for schools prior to colleges.

In view of these initiatives, "Masterplan for IT in Education" was developed in April 1997 as a comprehensive program to implement ICT technology within educational scene. The MOE Web site indicates that this Masterplan aims to show the future image of IT used in schools, as well as to substantiate environments with abundant IT resources.

Specific objectives of master plan are comprised of the following 4 items:

(a) To reinforce collaboration between schools and society

An interchange and collaboration between teachers/students and other organizations are promoted, enabling a broader view to be obtained.

(b) To implement innovative processes

New educational strategy is developed to seek new possibilities for curriculums and evaluation. Each school can independently take advantage of IT resources, allowing new school designs to be achieved to using IT effectively in educational scenes.

(c) To improve creative thinking, lifelong learning, and awareness for social liability

Students make progress in developing flexible thinking and creativity through IT-based learning, resulting in the promotion of interchange and the collaboration of a healthier appreciation of values.

(d) To enhance administration and management of educational system

Efficiency in management and communication activities is improved through the usage of IT, to facilitate more efficient educational management.

To achieve the above objectives, the following four items are thought to be important:

(a) Creation of curriculum, method of its evaluation, and criteria

(b) Development of learning resources

(c) Training of teachers

(d) Establishing physical and technical infrastructure

MOE has decided to budget 5 billion Singapore dollars for the implementation of its master plan for 5 years, and to establish Educational Technology Division (ETD) to start education, 10% of which is based on IT using one PC per 6.6 pupils in primary schools, as well as to start 10% IT-based curriculum using one PC per 5 students in secondary schools and junior colleges. The initial budget shared by each school consists of 1.3 million Singapore dollars for elementary education, 2 million Singapore dollars for secondary education, and 2.2 million Singapore dollars for junior colleges. Thus, the implementation plan is made up of three phases.

First phase: 22 primary and secondary educational organizations
 (10 primary educational institutions, 10 secondary educational institutions, and 2 junior colleges)

Second phase: 100 educational organizations

Third phase: 230 educational organizations

4.2.3 E-Learning Related Organizations

E-Learning activities in Singapore are situated centering on ECC. Other related entities are also involved in the establishment and operation of ECC, and their collaborations are expanding.

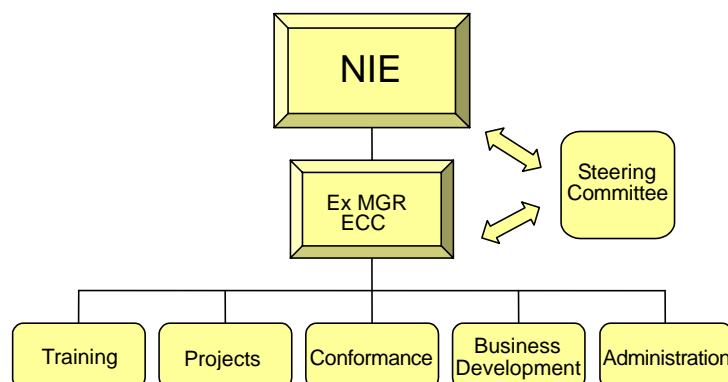
(1) E-Learning Competency Centre (ECC)

<http://www.ecc.org.sg/>

ECC is a non-profit organization established in December 2001, being financed by IDA, MOE, and the e-Learning Chapter of the Singapore Information Technology Federation (SITF), to introduce standard specifications into e-Learning in Singapore. When it was established, computers and other items were donated by Sun Microsystems. Its office is located in the premises of NIE.

ECC aims to implement international standards and improve competitiveness of specialists to make Singapore an e-Learning hub in Asia Pacific region, and then to promote the availability of effectiveness of e-Learning.

ECC is organized as follows:



Source: L. K. Chew (2003.1), the document presented in "International Seminar on e-Learning 2003"

Figure 4-1 ECC Organization Structure

Currently, the Steering Committee is composed of delegates from NIE, MOE, IDA, and the e-Learning Chapter of SITF, but it is planning to accept new members from both governmental and civil organizations. The Executive Manager leads the operation of ECC, and is responsible for reporting to the Steering Committee on overall activities.

ECC plays the following three major roles:

- (a) Accept and encourage usage of e-Learning standard specifications.

For this purpose, it attends various international conferences to act as a delegate from Singapore.

- (b) Organize seminars, talks, workshops, and publish online newsletters, for the purpose of broader public acknowledgement.

One of these activities is "World Standards Day". The persons concerned from various countries are invited to conferences and seminars held around October each year, to discuss standardization efforts for each field including e-Learning. Additionally, it has established an "e-Learning clearinghouse (<http://www.elearninghouse.com/>)" and developed "Plugfest" through cooperation with ITSC, to provide extensive e-Learning information of Singapore and the Asian region.

"Plugfest" is an event concerning the standardization of e-Learning, where enterprises engaged in e-Learning can show how they conform to international standards and show the interoperability of their products. It is especially expected to play a role as a platform for small and middle size enterprises in the domestic IT industry.

"PlugFest" for 2002 was held as an IMS-based e-Learning Plugfest during 20 days from June 20 to July 10, which was attended by 10 enterprises. During this period, each enterprise had its products tested at individual stages of Meta-data, Content Packaging, and Question & Test Interoperability, and vendors were awarded a certificate of interoperability if the operation on different e-Learning systems was successful without causing any problems. The standards applied on this occasion were SingCORE Meta-data Schema v1.0, IMS Meta-data Specification v1.2.2, IMS Content Packaging Specification v1.1.3, and IMS QTI Lite Specification v1.2. ITSC's Certificate of Interoperability is highly evaluated, and is used as the criteria for the creation of estimates by some organizations.

The next Plugfest will be held in 2003 focusing on SCORM.

- (c) Establish guidelines and test methods to ensure that resources for e-Learning are not dependent on the platform and are re-usable in any e-Learning context.

Activities for this purpose include acquisition of approval for international standards such as ISO9000, and the publishing of "Quality Criteria for e-Learning Courseware", or "Recommended Process for e-Learning Courseware Development."

- (2) Standards, Productivity and Innovation Board (SPRING Singapore)

<http://www.spring.gov.sg/portal/main.html>

This is an organization to coordinate various standardization programs at the national level, not being limited only to the e-Learning field.

- (3) Information Technology Standards Committee (ITSC)

<http://www.itsc.org.sg/>

ITSC is an industry-led organization promoting the implementation of technology standards, established in 1990 under the authority of the Standards Council, members of which are selected by SPRING Singapore. While ITSC is comprised of members who are volunteers from the industry field, it is assisted by SPRING Singapore and IDA, and forms a part of the national information communication standardization program developed by SPRING Singapore. Implementation of the standards criteria recommended by ITSC is entirely voluntary. In some cases, however, the criteria are referenced by an administrative organ, and its implementation may be made obligatory.

The Standards Council appoints the Chair of ITSC and its tenure is three years. The chair of ITSC is also a member of the Standards Council. Secretariat of ITSC is IDA.

ITSC Council members are comprised of representatives from parties involved (governmental organization, IT industry field, and specialized, educational, and research organizations), aiming at the promotion of standardization in Singapore.

ITSC aims at encouraging Singapore to join activities in developing standards criteria for international information communication through the promotion of a national information communication standardization program, and currently commit itself to the implementation of Singapore Standards through the efforts of eight technology committees and its subsidiary working groups. The number of specialists currently participating in ITSC standardization activities is as many as 250 from 180 organizations.

Within ITSC, the Learning Standards Technical Committee (LSTC) handles activities related to e-Learning. This committee is comprised of governmental officers, enterprises engaged in e-Learning, and representatives from higher educational institutions, and they are responsible for monitoring international trends of e-Learning standards, promoting the use of relevant e-Learning standards in Singapore, and recommending the development of reference systems. Two working groups, which are subsidiary to the committee, handle e-Learning standards and continuous education/training.

LSTC plans to integrate Specification for e-Learning Framework (SeLF) into Singapore Standard for e-Learning, and has released Part 1 and 2 in 2001, and Part 3 and 4 in 2002 from among all nine parts.

The structure of SeLF will be organized as follows:

Part 1: An overview

Part 2: Learning resource identification

Part 3: Learner profile

Part 4: Competency definitions

Part 5: Learning content packaging

Part 6: Assessment & progress tracking

Part 7: eBook

Part 8: Enterprise integration

Part 9: Digital rights management

4.3 Laws Regulating Rights for Intellectual Property and Personal Information in e-Learning

4.3.1 Overview

According to the Website of Ministry of Law, intellectual property administration in Singapore is a primary commitment of the Ministry, and intellectual property rights are regarded as important "properties" as Singapore is changing to a knowledge-based society. The Intellectual Property Office of Singapore and Copyright Tribunal play a central role for protection.

Singapore is a member of the World Intellectual Property Organization (WIPO), WTO Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs), and the Berne Convention. However, its protection for intellectual property rights is not sufficient in view of global standards, leaving challenges to be addressed.

4.3.2 Laws and its Details

Copyright act: Enacted in 1987 with assistance from the USA. It was formerly based on British copyright laws of 1911.

In current copyright act, computer programs are protected as an object covered by the copyright law.

Article 17: "Under the Singapore Copyright Act, reproduction of a work in a material form is defined to include storage of the work, or an adaptation of the work a) in a computer, or b) on any medium by electronic means and the making of a copy which is transient or is incidental to some other use of work."

Article 26 (1) (c): Defines copyright licensing of computer programs.

Article 39 (1): Deals with creation of backup copy of computer program.

It is reported that there has been no judicial precedent as of 2000 regarding programming language, interface protocol, and algorithm.

4.4 Vision

4.4.1 Overview

According to IDA, e-Learning policies in Singapore are being progressed focusing on the following four issues:

- To establish infrastructure
- To invite to Singapore global level e-Learning service providers
- To encourage collaboration among industry, government, and academic society to develop and implement e-Learning programs
- To collaborate with civil society to promote e-Learning services

Factors preventing e-Learning from progressing that are recognized by IDA include shortages of knowledge/experience, funds, infrastructure, and contents, in addition to reluctance (to implement e-Learning) on the part of enterprises.

Therefore, IDA has developed a strategy for domestic e-Learning promotion focusing on three objectives: establishment of infrastructure, development of e-Learning, and innovative leadership.

The following issues are specifically defined as activities (objectives):

- (1) Establish an e-Learning infrastructure project across industry to enable its extensive implementation.
- (2) Develop financial incentives to encourage the introduction of e-Learning to corporate or organizational education.
Example: e-Learning Early Adopters Programme (e-LEAP)
- (3) Raise funds when starting the business.
Example: Start up Enterprise Development Scheme (SEEDS) by Economic Development Board (EDB)
- (4) Support the development of domestic enterprises through projects, collaborations, and international deployments.
- (5) Invite world-class enterprises to establish local organizations.
- (6) Develop and evolve e-Learning in the context of instructional design and multimedia technology.
Example: Strategic Manpower Conversion Programme (SMCP)
Critical Infocomm Technology Resource Programme (CITREP)
- (7) R&D of e-Learning applied into learning models or environments which are innovative in terms of pedagogy.
- (8) Establish ECC.
 - To promote e-Learning application, improve awareness, and promote actual usage.
 - To develop e-Learning standards criteria and improve interoperability.
 - To specialize e-Learning and grant certificate to systems and contents.
- (9) Develop a framework appropriate to create incentives which are useful to promote broader usage of e-Learning for technology training and improvement.
Example: e-Learning Training Incentive Programme (e-TIP)

4.5 International and National Conference

Conferences that were held on e-Learning include the following:

(1) "Online Learning Asia"

- Date: May 14-16, 2002

This was first held in 2001, and second conference was held in 2002. In the second conference, the number of attendants was considerably fewer than expected, and therefore it hasn't been decided yet if another one will be held in 2003.