Federated States of Micronesia
Technology Plan for Grades K – 12

Transforming Education through Technology

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Federated States of Micronesia (FSM)
Association of Chief State School Officers (FACSSO)

FSM National Department of Education
Secretary Casiano Shoniber
Government of the Federated States of Micronesia
Palikir, Pohnpei FM 96944
Phone: (691) 320-2609/2647
Fax: (691) 320-5500
Web site: http://www.fsmed.fm/

Chuuk State School System
Executive Director Gardenia Aisek
P.O. Box 460
Weno, Chuuk, FM 96942
Phone: (691) 330-2203

Kosrae State Department of Education
Director Paul Hadik
P.O. Box ED
Kosrae, FM 96944
Phone: (691) 370-3008
Fax: (691) 370-2282
Web site: http://www.kosraedoe.com/

Pohnpei State Department of Education
Director Joseph Villazon
P.O. Box 250
Kolonia, Pohnpei FM 96941
Phone: (691) 320-2104/5
Fax: (691) 320-5510
Web site: http://www.pohnpeidoe.fm/

Yap State Department of Education
Director Sister Margou
P.O. Box 220
Colonia, Yap FM 96943
Phone: (691) 350-2150
Fax: (691) 350-2399

College of Micronesia – FSM
President Spensin James
P.O. Box 159
Kolonia, Pohnpei FM 96941
Phone: (691) 320-2480
Fax: (691) 320-2479
Web site: www.comfsm.fm

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ACKNOWLEDGEMENTS

This FSM Technology Plan K – 12 is the work of numerous educators and stakeholders in the FSM education system. The write up of the plan was heavily influenced by educators, who attended the national workshops held in March and July August 2010 and State workshops held in April & May 2010 to assist with the plan's development.

The plan also benefited from meetings and discussions with representatives and trainers from the One Laptop Per Child (OLPC) project, Secretariat of the Pacific Community (SPC), World Bank, Asian Development Bank, University of Guam, FSM National and State Governments and the FSM Telecommunications Corporation.

Extensive research was also conducted with emphasis on the ISTE NETS Standards for Students, Teachers and Administrators/Principals and related materials; OLPC materials; ADB, World Bank and UNESCO materials and findings on ICT projects for developing states in the Asia/Pacific region; and the US Technology Plan 2010.

Principal authors of the FSM Technology Plan for K – 12 were:

Jimmy Hicks
Director, Institutional Research and Planning
College of Micronesia – FSM
P.O. Box 159
Pohnpei, FM 96941
Phone: (691) 320-2480 ext 119
Fax: (691) 320-2479
Web site: www.comfsm.fm
Email: Jhicks@comfsm.fm

Gordon Segal
Director, Information Technology
College of Micronesia – FSM
P.O. Box 159
Pohnpei, FM 96941
Phone: (691) 320-2480 ext 134
Fax: (691) 320-2479
Web site: www.comfsm.fm
Email: gsegal@comfsm.fm

EXECUTIVE SUMMARY

The FSM Technology Plan K – 12 is designed to provide a framework for use of technology to help transform the FSM education system. The term Information and Communications Technology (ICT) is used in this plan to indicate that technology goes far beyond just computers.

The core of the plan is adoption and implementation of the International Society for Technology in Education NETS Standards' for Students, Teachers and Administrators/Principals. This approach is somewhat unique in that not only student standards are used, but also standards for teachers and administrators/principals. The critical element in implementation of ICT in schools is its support for learning, assessment, teaching and improving productivity.

Technology by itself will have limited impact on improving student and teacher learning and increasing productivity in the school system. Studies by the Asian Development Bank (ADB) have shown that many technology projects fail. This plan provides recommendations on the needed steps to take to ensure that ICT is successfully applied in the FSM education system.

Factors that affect successful implementation of technology include need for a national wide technology policy that supports needs of the education system; knowing the true cost of technology including initial purchase price, replacement costs, reoccurring costs (Internet access, etc.) and associated costs (training, etc.); and need for a strong monitoring and evaluation (M & E) system. This plan recommendations that no ICT purchase be made without an approved plan that addresses how the technology will impact learning, assessment, teaching and productivity and a M & E plan to allow tracking and evaluation of actual impact.

The basic principle in the FSM Technology Plan K – 12 is to move students toward achievement of 21st century skills. This means moving toward a ratio of one computer per child (OLPC model) that allows interaction across classrooms, schools, the state, the FSM and the world and developing the cognitive skills that are needed for economic and social growth of the FSM.

There are major barriers to effective use of modern day technology in the FSM. Lack of adequate and cost effective Internet access is added on top of existing transportation and geographical barriers. Recommendations to address these problems include adopting a school server and wireless network approach similar to the OLPC model (Note – departments are encouraged to review and adopt the OLPC program and/or thin system approaches to computer usage in schools) where material can be downloaded by the central office and placed on school servers to allow high speed local access.

An additional major issue is redesigning the education budgeting process in the FSM regarding technology. Internet access can open up the FSM to opportunities never before available. Major impact can be found on training of teachers and staff, improved communications for the education community and with stakeholders, downloading of standards based lesson plans and resource materials, providing alternate paths for replacing textbooks and other high cost items, and opening up opportunities for teachers and staff to interact with peers in the FSM and in the International community.

Opportunities for improved ICT use are available through fiber optic cable landing in Pohnpei, alternate satellites (GE 23 & O3B) offering access to the Internet, and international donor assistance (focus on outer islands). However, research based mechanisms must be put in place to respond quickly to opportunities for improving learning for students and teachers.

ICT can have an impact on learning of students and teachers and improved productivity in the FSM, but only if rigors design, implementation and M & E processes are adhered to.

INTRODUCTION

BACKGROUND

The FSM, a small island developing state, is a federation composed of the states of Chuuk, Kosrae, Pohnpei and Yap. The National Government main offices are located Palikir, Pohnepi. The FSM is located[1] in the Northwest Pacific and has 607 islands extending 2,900 kilometers from east to west and covering ~ 2,500,000 square kilometers of ocean. However the land mass of the FSM is only 702 square kilometers.

The FSM 2000 census put the population at 107,008 and the estimated population for 2006 is 108,004. A growth rate of 2.6% in the 70s and early 80s has slowed to 0.3% since 1994 due to declining fertility and emigration. A median age of 18.9 in 2000 suggests that the FSM has one of the youngest populations of Pacific island countries. The unemployment rate in the FSM in 2000 was 22 % based on International Labor Organization classifications.

The FSM has a unique relationship with the United States as defined under a Compact of Free Association. "The Compact of Free Association between the Federated States of Micronesia and the United States provide for U.S. economic assistance (including eligibility for certain U.S. federal programs), defense of the FSM, and other benefits in exchange for U.S. defense and certain other operating rights in the FSM, denial of access to FSM territory by other nations, and other agreements."[2] Limited economic growth coupled with free access to the US for work, schooling and joining the US military have resulted in high emigration rates.

Transportation and communications are impacted by the geographic location and distribution of islands in the FSM. Air travel is costly with international connections only at the main island in each state. Transportation between the smaller islands of each state is erratic via ocean going field trip vessel or special charters. It can be months between stops at outer islands with limited time for each stop.

Telecommunications is provided primarily by the FSM Telecommunications Corporation. Costs tend to be high and provided primarily on the main islands in each state. Fiber became available in Pohnpei in April 2010, but high cost of bandwidth and limited distribution schemes have limited its impact. Satellite services continue to be provided to Chuuk, Kosrae and Yap. There have been discussions regarding opening up the telecommunications to more than one service provider.

Reliable electrical power is an issue in all states. Chuuk has had long standing power generation and reliability problems on Weno and Pohnpei island power generation has been becoming more erratic in 2009/2010. Kosrae and Yap (Main Island) have had more reliable power generation. Major problems with power are seen in Chuuk lagoon islands and all outer islands. Bright spots for outer islands power generation are in the EU solar systems being put in place on selected islands, and power generation system on some of the outer islands of Yap.

[1] See figure 1: Federated States of Micronesia Islands and Location in the World.
[2] More on the Compact of Free Association can be found on the Legal Information System of the FSM http://www.fsmlaw.org/compact/.

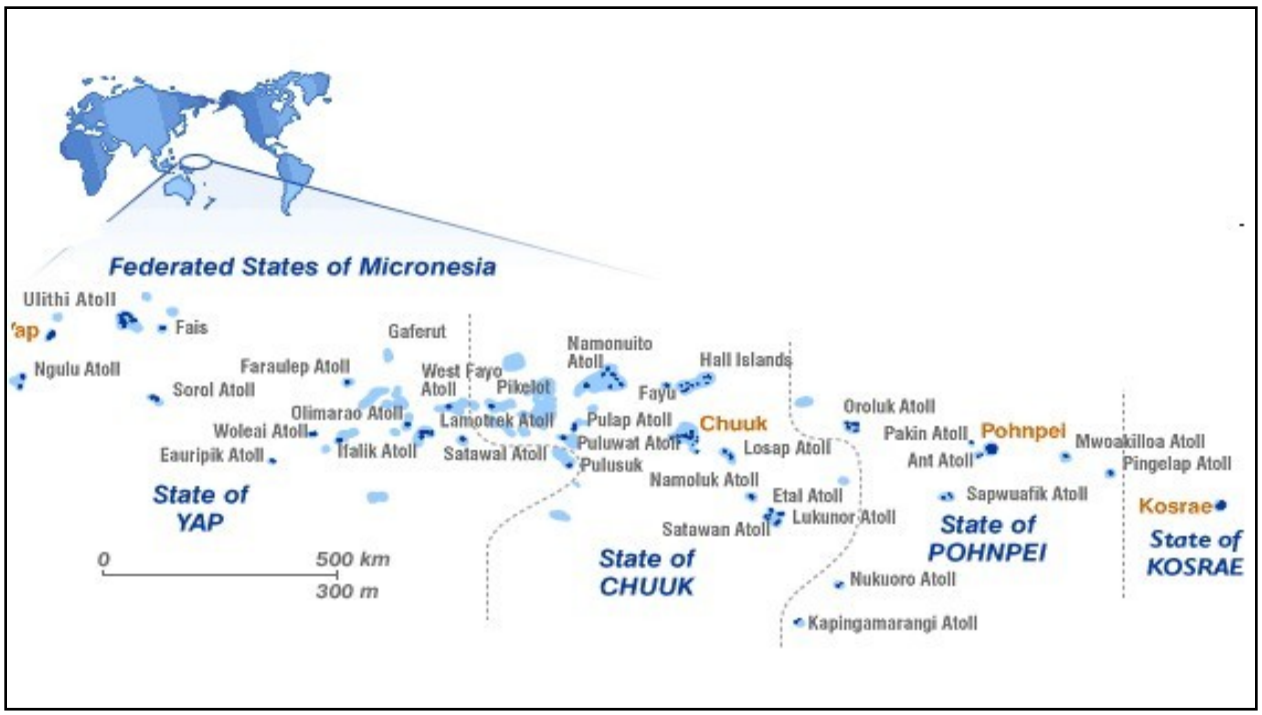

Figure 1 - Federated States of Micronesia Islands & Location in the World

DEFINING THE NEED FOR CHANGE

DIGITAL DIVIDE[3]

Definition dig·i·tal di·vide

NOUN

1. Inequality of access to information technology: the difference in opportunities available to people who have access to modern information technology and those who do not.

Economic growth is being driven by information technologies around the world. As shown in the PISA report referenced below links between economic growth and cognitive skill development of a workforce is clear. While ICT cannot assure increased cognitive skills development in students, when applied in a matter that enhances and expands the learning experience, ICT can be a major driver of change in school systems.

The digital divide is real and growing in the FSM. Few students, teachers and schools have access to the Internet for learning and improved teaching. Internet access, where available, is measured in kbps for whole departments of education. ICT tools, including computers, are often purchased without clear understanding of how they will be used and what is there intended impact.

Most international carriers recommend the following down/up bandwidth ratio per user: 512 / 128 Kbps for 1 user, 512 / 256 Kbps for up to 4 users, 1024 / 256 Kbps for up to 10 users, 1024 / 512 Kbps for up to 40 users, 2048 / 1024 Kbps for up to 80 users, 2048 / 2048 Kbps and beyond for 300+ users.

[3] Encarta® World English Dictionary [North American Edition] © & (P) 2009 Microsoft Corporation. All rights reserved. Developed for Microsoft by Bloomsbury Publishing Plc.

TRANSFORMATION OF LEARNING ENVIRONMENTS

ICT has an impact when its assists with the transformation of learning environments. ISTE has identified the following transformation of learning environments[4] in a matter that allows easy identification of ICT tools that supports transformation of students, teachers, schools and the systems they operate in. It has been noted that while current FSM education system practices fall largely in the US education environment, the traditional Micronesian Learning Environments discussed below are largely compatible with the Emerging Learning Landscape being promoted for developing 21st century learning skills.

Traditional Environments	Emerging Learning landscape
Teacher-directed, memory-focused instruction	**Student-centered, performance focused learning**
Lockstep, prescribed-path progression	**Flexible progression with multipath options**
Limited media, single-sense stimulation	**Media-rich, multisensory stimulation**
Knowledge from limited, authoritative sources	**Learn-constructed knowledge from multiple information sources and experiences**
Isolated work on invented exercises	**Collaborative work on authentic, real-world projects**
Mastery of fixed content and specified processes	**Student engagement in definition, design, and management of projects**
Factual, literal thinking fro competence	**Creative thinking for innovation and original solutions**
In-school expertise, content, and activities	**Global expertise, information, and learning experiences**
Stand-alone communication and information tools	**Converging information and communications tools**
Traditional literacy and communication tools	**Digital illiteracies and communication skills**
Primary focus on school and local community	**Expanded focus including digital global citizenship**
Isolated assessment of learning	**Integrated assessment for learning**

STUDENT ACHIEVEMENT

The following tables provide baseline data for comparison of student skills and knowledge on graduation from high school in the FSM. The COMET[5] is a test administrated yearly to assist in determining the college readiness of high school graduates.

Table 1 - COMET 2010 Essay Score Distribution

Essay Score	45+	40-44	35 - 39	30-34	25-29	20-24	>20	total
Total	4.8%	7.5%	9.7%	13.4%	15.7%	17.1%	31.7%	100.0%

The essay component of the COMET is scored using a common rubric. The essay is often seen by college faculty as a good indicator of how well students will perform in college. A new developmental education proposal by the college will phase in more stringent requirements for writing. For 2010 an essay of 34 is required to be admitted into degree programs (some or multiple development level course may be required). An essay of 30 is required for entrance into the developmental education program and a score of 20 into certificate programs.

[4] ISTE NETS standards reference.
[5] College of Micronesia – FSM Entrance Test

Table 2 - COMET 2010 Reading Comprehension (grade equivalent)

Grade Equivalent	12+	10 & 11	8 & 9	6 & 7	>6	total
Reading Comprehension (Grade Equivalent)	9.5%	9.5%	22.1%	40.9%	18.1%	100.0%

Table 2 provides the percent of students' reading comprehension by grade equivalence using the Gates/McGinnity examination.

Table 3 - COMET 2010 Math Placement by Course

Course	101	100	099	096	095	total
Percent	5.0%	8.8%	25.0%	21.9%	39.1%	100.0%

Table 3 provides 2010 COMET placement by math course. Courses 100 (College Algebra) & 101 (College Algebra and Trigonometry) count toward degree obtainment while 099 (Intermediate Algebra), 096 (Elementary Algebra) and 095 (Pre algebra) are developmental in nature.

EDUCATION & ECONOMIC GROWTH

The High Cost of low Educational Performance – PISA (OECD), Programme for International Student Assessment is a report that while focusing on developed countries also can be seen to apply to developing states. The following is a brief summary of key education factors affecting economic growth.

Area	Impact
Commitment to outcomes	PISA represents a commitment by governments to monitor the outcomes of education systems in terms of student achievement on a regular basis and within an internationally agreed common framework. It aims to provide a new basis for policy dialogue and for collaboration in defining and implementing educational goals, in innovative ways that reflect judgments about the skills that are relevant to adult life.
Role of Education	The relationship between cognitive skills on the one hand and innovations and technology on the other seems to be a natural view of the role of education.
Relative small improvements can have a large impact	This report uses recent economic modeling to relate cognitive skills – as measured by PISA and other international instruments – to economic growth. The relationship indicates that relatively small improvements in the skills of a nation's labour force can have very large impacts on future well-being.
Primary schooling influences GDP	To give an idea of the robustness of this association, an extensive empirical analysis by Sala-i-Martin, Doppelhofer, and Miller (2004) of 67 explanatory variables in growth regressions on a sample of 88 countries found that primary schooling was the most robust influence factor on growth in GDP per capita in 1960-96
Cognitive skills and economic growth	Over the past ten years, empirical growth research demonstrates that consideration of cognitive skills dramatically alters the assessment of the role of education and knowledge in the process of economic development.

MICRONESIAN LEARNING ENVIRONMENTS

While there has been limited research into learning styles and learning environments in Micronesia, a recent dissertation (2009) by L. Robert Barber, Jr. of the University of Guam's College of Natural and Life Science provides an excellent introduction to the topic. It also provides a framework for reviewing our learning environments and how they fit with current practices at the secondary and post secondary levels in the FSM. The dissertation also provides an overview of why many of the common instructional/cultural practices in the US do not address or fit learning styles of Micronesians.

Dr. Barber's research found:

Four social/cultural factors shaping perceptions of learning environments:

- Communal nature of knowledge transfer
  - Connect learning networks
  - Shared responsibility for learning during social events
  - Learning with/from peers
- Indigenous methods of knowledge transfer
  - Demonstrate then practice /apply
  - Correction in process, or product from practice
- Social hierarchy based on age, gender and status
  - Respect, formal language for gatherings, rank
  - Silence, or caution in public speech
- Prominence of group membership and relations

Factors in the classroom environment that promote learning

- Supportive instructor
  - Is there for you
  - Is encouraging
  - Monitors and provides feedback
- Hospitable learning environment
  - Instructor is open, welcoming and familiar
  - Peer familiarity and support fostered
- Interactive and experiential instructional approaches
  - Peer learning, group work, and class discussions
  - Learn then apply
  - Outside class (real world) experiences

Factors in the classroom environment that inhibit learning

- Cultural communication protocol
  - Silence in public gatherings
  - Impolite to talk too much
  - Fear of being wrong in public
- Lecture only instructional approach

While Dr. Barber's research focused primarily on adult learning, emphasis was also placed on how Micronesians traditionally learn. The research has implications for both elementary and secondary levels as well as teacher & administrator/principal training.

A major use of Dr. Barber's research is to ask ourselves, "Do our teaching strategies and learning environments in ECE, elementary, secondary and post secondary levels fit the learning styles of Micronesian students?"

NEED FOR CHANGE

Micronesian students are performing significantly below their international peers by most definitions and data sets. Current practices for ICT in the education system and limited Internet access means the FSM education system is on the wrong side of the digital divide. While in itself ICT cannot correct all the problems of the FSM Education System, if used properly, ICT can have a significant impact on student success and transformation of the learning landscape in the FSM.

JEMCO MANDATE

The development of the FSM Technology Plan K – 12 is a required JEMCO mandate that is to be completed prior to the August 2010 budget review meeting. The following was provided as guidance for the plan development from the Office of Insular Affairs (OIA).

Minimum Expectations

- The plan will consist of standards and a realistic implementation schedule

Technology Standards

- Interpret International Society for Technology in Education (ISTE) standards for students, teachers, and administrators, restating them in a manner meaningful to FSM Educators, and guide stakeholders to adopt and adapt standards that are realistic in the FSM context
- Summarize the standards into a mission statement that articulates their overall vision for technology in education.
- Set goals and objectives for the standards for the three constituent groups (students, teachers & administrators)

Implementation Planning

- Integrate evaluation activities to track the effectiveness of the plan in reaching standards
- Describe the electrical and technology infrastructure that must be put in place to realize the standards
- Develop inventory policies and procedures, starting with current equipment and including an assessment of the capacity of that equipment to support standards
- Determine the hardware and software that the system needs to purchase to support its goals and objectives
- Determine IT needs to maintain the new resources at the administrative, teacher and student levels
- Review current staff capacity and determine what IT and user training will be necessary to implement the standards
- Determine the costs of training, equipment purchases and replacement, maintenance and develop a long range budget strategy to sustain the vision for technology in education

REGIONAL TECHNOLOGY PROJECTS & OPPORTUNTIES

Regional technology projects and opportunities have been detailed with analysis by Bruce Best of the University of Guam[6]. Following is a brief overview of the technology projects and opportunities for the FSM based on Mr. Best

[6] Communications and Infrastructure: FSM-EWS Assessment & Recommendation Project; Bruce Best September 2009; TADEO Publication No. 519 and Communication Options for the Western Pacific Regional Colleges; Bruce Best August 2009; Publication No. 498.

documents and conversations with Mr. Best and other resource individuals and documentation. The summary is divided into ICT and power projects and opportunities.

ICT & Energy Projects

- The Asia Pacific Telecommunity (APT) has funded telecenters in Tonoas, Chuuk; Madolenihm, Pohnpei; and Walung, Kosrae as pilot projects for extending telecenter opportunities for remote areas.
- Disaster preparedness – In cooperation with NOAA, SOPAC and other entities, emergency communication and data collection equipment have been placed on numerous outer islands.
- PEACESAT – a long standing program for communication between FSM states and international sources coordinated by the University of Hawaii.
- RICS systems are being placed in a number of outer islands that allow direct Internet access through the GE 23 satellite.
- Wave mail via single side band radio for low bandwidth email and data transmission.
- EU funded solar power systems in outer islands.
- SPC supported OLPC programs.

ICT & Energy Opportunities

- Internet access issues can be addressed currently by expansion of the RICS system for outer islands, direct Internet access through the GE 23 or other satellites. RICS type systems can also be deployed at any site where Internet access may not be possible from a local telecommunications provider.
- Additional programs that may affect the FSM in the near future include the WINDS project out of Japan and the international O3B mid-orbit satellite system.
- Extension of submarine fiber optic connectivity to all four FSM states.
- EU solar power system expansion to additional outer islands.
- SOPAC and other funding agencies for other renewable energy generation and storage.
- Seeking funding for renewable energy generation for remote schools including Chuuk lagoon islands.
- Seeking additional funding sources such as the US Farm Bill, Sasakawa Peace Foundation, and other foundations and governments.

THE FSM EDUCATION SYSTEM

BACKGROUND

The FSM runs a US style education system with primary funding for operations coming from provisions of the Compact of Free Association. The FSM National Department of Education (NDOE) sets standards while the State Departments of Education (SDOEs) are responsible for curriculum and instruction.

SCHOOLS, ENROLLMENT & TEACHER STATUS

The following data is from the JEMCO 20 Education Indicator Report[7] for 2009 that reports on school year 2008/09. Please note the following section on problems that the FSM NDOE is facing in compiling an accurate and comprehensive report.

The number of schools in the FSM is 254/252[8] in school year 2008/09. In terms of this Tech Plan of importance is that 60% of schools in the FSM have 100 or less students with 42% of schools having 50 or less students.

[7] JEMCO 20 Education Indicators Report is a required yearly submission from the FSM Education System under the Compact of Free Association.
[8] The FSM NDOE views the difference in the number of schools as a reporting and definition error.

Table 4 - JEMCO Indicator #1: No. of Schools in the FSM

1. Number of Schools by elementary and secondary level, including ECE/Sped centers					
State	ECE	Elementary	Secondary	Other	No. Schools
Chuuk	**45**	**87**	**21**		**153**
Kosrae	*	**7**	**1**		**8**
Pohnpei	*	**31**	**3**		**34**
Yap	**26**	**30**	**3**		**59**
FSM	**71**	**155**	**28**	**0**	**254**

Table 5 - JEMCO Indictor #2: Schools in the FSM by Size

State	Up to 50	51-100	101-200	201-300	301-500	501-1000	1001 +	Total
Chuuk	**61**	**38**	**38**	**11**	**3**	**2**	**0**	**153**
Kosrae	**1**	**1**	**1**	**2**	**3**	**0**	**0**	**8**
Pohnpei	**2**	**7**	**6**	**8**	**5**	**4**	**2**	**34**
Yap	**42**	**6**	**8**	**0**	**0**	**1**	**0**	**57**
FSM	**106**	**52**	**53**	**21**	**11**	**7**	**2**	**252**

Also of note is the decline in enrollment being seen by FSM Education System again projections for total school age population. Difference between projected enrollment and actual enrollment is highest in Kosrae and Yap at approximately -30% below projected levels.

Table 6 – JEMCO Indicator #8: FSM Student Enrollment Actual versus Projections

State		4-5 yr	6-13 yr	14-18 yr	Total
Chuuk	Projection	**2550**	**10105**	**6137**	**18792**
	Actual	**889**	**9489**	**4087**	**14465**
Kosrae	Projection	**426**	**1462**	**890**	**2778**
	Actual	**68**	**1283**	**620**	**1971**
Pohnpei	Projection	**1840**	**6902**	**3788**	**12530**
	Actual	**636**	**7454**	**2539**	**10629**
Yap	Projection	**597**	**2152**	**1145**	**3894**
	Actual	**268**	**1470**	**952**	**2690**
FSM	Projection	**5413**	**20621**	**11960**	**37994**
	Actual	**1861**	**19696**	**8198**	**29755**

Teacher education status shows 36% of teachers in SY 2008/09 still do not have an associate's degree, 54% have an associate's degree, but there is limited data regarding when degrees were obtained and the major/minor of those degrees.

Table 7 - JEMCO Indicator #5: Teacher Education Status

5. Number and percent of staff by education level											
State	No degree		AA/AS		BA/BS		MA/MS		PhD		Total
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
Chuuk	186	237	185	211	38	39	4	1	0	0	901
Kosrae	6	2	87	82	14	9	0	0	0	0	200
Pohnpei	6	23	195	179	55	38	0	1	0	0	497
Yap	107	116	90	43	8	11	1	0	0	0	376
FSM	305	378	557	515	115	97	5	2	0	0	1974
Percent	15.45%	19.15%	28.22%	26.09%	5.83%	4.91%	0.25%	0.10%	0.00%	0.00%	100%

DATA AND DATA REPORTING

Data and data analysis are critical elements of any education system. Quality decisions are driven by evidence. The lack of comprehensive data systems, analysis, reporting and research for the FSM Education System inhibits evidence based decision making. The following section is extracted from the JEMCO 20 Education Indictors 2009 report.

JEMCO 2009 Indicators Report

"Issues and Potential Solutions

There are still problems with data accuracy, consistency of reporting of data, and coding of data. While efforts had been made to assist state in submitting data, states continue to fall behind meeting submission deadline and data consistency. Cooperation between state DOE and National DOE must be strengthen in order to address and improve the current issues pertaining to data consistency and timely submission.

1. **Different Data Management Application**

   The four Department of Education in the FSM continue to utilize different data collection systems: *Pacific Education Data Management Information System (*PEDMS) web based, excel version and regular excel program. In 2007, through the Basic Social Services program(BSS), a consultant developed a Data Management System in Microsoft access for state DOE's to utilize in collecting and managing education data. However, during the SY07-08 school year, data submission from states to NDOE using the new software indicate that states are not familiar/comfortable with the access software.

   In our effort to address the data collection/submission setbacks, National Department of Education developed a simple tool in Microsoft excels (widely used application) to allow states to copy their data from their current systems into the spreadsheet and submit to NDOE for data analysis and report generation.

   In January of 2009, NDOE data staff had a meeting with state data managers to introduce the data collection tool which will be used by states to submit their SY08-09 data to NDOE. Overview of the excel spreadsheet and submission timeline was addressed to improve FSM reporting to JEMCO and other agencies.

2. **Consistency and timely submission of data**

   It is evident that continued setbacks in timely submission and consistency of data from states to NDOE stem from human elements and not system which states must resolve immediately.

   During the January 2009 meeting, state data managers were advised to submit their data on time to allow both NDOE and state DOE amble time to do data cleaning and edit checks. However, late submission of reports and lack of communication response from states prevents the NDOE from submitting a complete JEMCO report.

   The department is still considering a much more drastic measures and recommendations for the states to comply with:

- Incorporate grant conditions into the states' Education Sector grant which may lead to the withholding of state's sector grant allotment should the practices of late submission continues;
- Replacement of data specialists at the states;
- Take the issue up to the states higher up leadership; and,
- Recommend to the Congress to mandate stricter sanctions for defiant state.
- Other measures may be considered on a case to case basis.

3. **Accuracy and cleanliness of data**
   FSM continue to rely on outdated population projection dated back to year 2000 which certainly compromise the credibility of data calculation and comparison due to lack of accurate population data. FSM statistic office is gearing up for a new census which is slated for year 2010. With the updated census, data on population will be more accurate and up to date which renders the nation a more credible population count.
4. **Training for Data Managers**
   Steps to modify the JEMCO report which will incorporate new performance indicators is in the process. Data manager in all state DOE will be part of the revision and also be trained to undertake the new reporting indicators.
5. **Early Childhood Education (ECE)**
   In October of 2005, the former Family Head-Start Program was virtually incorporated into the State Departments of Education by provisions of the Compact-SEG fund, thus established the Early Childhood Education Program. The nation still needs to formally establish the Early Childhood Education Program in the nation and further resolve the issue of separate submissions on ECE data reports. Two states still submit this year separate progress reports on ECE."

Developing a reliable data collection, analysis and accessible reporting system has to be a major priority of the FSM Education System.

ICT IN SCHOOLS

Some schools have at least one computer lab and a computer lab manager. Teacher training in technology literacy has been an ongoing effort for teachers. However, computer labs remain underutilized and many are limited to use for drill-and-practice programs or games. There needs to be aggressive pursuit of new training programs for teachers and a plan designed to address teacher deficiencies in technology literacy and basic technology skills, as well as provide guidelines for technology programs and integration into curriculum. These initiatives can result in increased usage of computers and technology integration across multiple disciplines, but low-bandwidth Internet/Network access continues to pose a problem for schools.

The current telecommunications infrastructure is limited by the high cost of telecommunications within the FSM and by the capacity of that infrastructure to support broadband services to schools. While some schools have access to computers and other technology, only some have some type of Internet access. Where it does exist it is not considered broadband, often limited to dial-up speeds. This limited level of service limits each school to no more than three concurrent users. As a result, technology use in schools is limited to those activities that do not require Internet access. These activities can involve the preparation of lesson plans by teachers and papers and reports by students. In most cases, a relatively small number of teachers are using computers or other types of ICT's as part of their instruction. Thus, few teachers have integrated technology into their instructional practices and rely on the computer for drill-and-practice programs or for classroom management activities, such as grade books and class lists.

DIFFERENCES BETWEEN THE STATE DEPARTMENTS OF EDUCATION

There are significant differences between the FSM states and circumstances under which education operates. While Kosrae is composed of only one island, langue and culture; Chuuk, Pohnpei and Yap have both main and outer islands along with multiple languages and cultures. Outer islands and the Chuuk lagoon islands outside of

Weno represent special problems with transportation, power and Internet access. Some specific issues related to Chuuk lagoon and outer islands in Chuuk, Pohnpei & Yap:

- Communications is often via to single side band radio.
- Textbook and materials/supplies distribution are hampered by the lack of reliable transportation to the outer islands. Field trip vessel visits can be few and far between, with stops of only hours at the various islands. Only a limited number of outer islands are assessable by small plane with schedules often being erratic.
- Teacher training is often regulated to summer sessions, when and where teachers are able to relocate to central islands. The burden of relocation for a two to three month period can be great.
- Support and maintenance of ICT is dependent on either on site capacity for maintenance and repair or visits of field trip vessel. Some repair and maintenance can be accomplished through couching over single side band shortwave radio.
- Power for ICT is problematic although the European Union projects for solar power in the outer islands can provide a steady power source.

COLLEGE OF MICRONESIA – FSM

The College of Micronesia – FSM has a national campus in Palikir, Pohnpei and four state campuses. A FSM Fisheries and Maritime Institute (FMI) is operated by the college under a Memorandum of Understanding with the FSM National Government. The college offers academic and vocational associates degree programs and certificate of achievement programs as well as short term training programs. A Bachelor of Arts degree in Elementary Education is offered in conjunction with the University of Guam.

BUILDING, IMPLMENTING AND EVALUATING THE PLAN

The following section provides information on the major research behind the Tech Plan; an overview of the ISTE NETS standards for students, teachers and administrators/principals; good practice in ICT from the ADB, and findings related to the current state of ICT in the FSM Education System.

BUILDING

There is currently a wealth of information on design and implementation of ICT into education systems. A challenge in developing the FSM Technology Plan K – 12 is determining which of the ICT designs and strategies best fit the conditions of the FSM as a small island developing state[9]. Geographically isolation of the nation, numerous remote and outer island schools, lack of Internet access and the low bandwidth and high cost where it is available all impact the type of ICT tools and programs appropriate for the FSM at this time. However, there are sound models and useable strategies for ICT that apply to small island developing states. The ICT tools and strategies represented in this plan are pulled together from a wide variety of sources. A summary of the major documents and programs affecting this Tech Plan are summarized below with a greater depth given to the most critical documents that affect design and implementation of ICT in the nation. Of particular importance have been:

- ISTE National Technology Education Standards (NETS)[10] for Students, Teachers and Administrators
  - The ISTE NETS standards provide not only the expectations for students, but also the standards and profiles for the transformation of teaching and administrative support needed to implement ICT into the FSM Education System.
  - Technology does not operate in isolation. The ISTE also provides a set of necessary conditions for implementing ICT in schools systems that impact all aspects and systems of the education system. The necessary conditions are included in the following section on implementing this plan.

[9] See http://www.sidsnet.org/aosis/ for information on the Alliance of Small Island States.
[10] See Appendix B for the ISTE NETS standards for students, teachers and administrator/principals

- The ISTE web site http://www.iste.org/ provides an overview of the full range of technology in education.
- The ISTE NETS standards are listed in greater below and the full standards are found in the appendix.

- ADB Good Practice in Information and Communication Technology for Education
  - Most ICT projects do not succeed or meet their potential in the Asia/Pacific region (and other regions). The Asian Development Bank has compiled a series of guides based on a review of technology funded programs in the region.
  - The development of this plan and its recommendations for change are structured around the good practices identified by the ADB. Due to the importance of understanding why ICT project fail & succeed, a summary of the ABD good practices in ICT for education follow in this section on building the ICT plan.
- US National Educational Technology Plan – Transforming American Education: Learning Powered by Technology
  - The draft US National Educational Technology Plan became available during the development of this plan and the research and reasoning behind the plan affected the development of this Tech Plan.
  - The FSM Tech Plan has adopted the goals structure of the US Plan: learning, assessment, teaching, infrastructure and productivity. As with the ADB Good Practice, the emphasis in the US technology plan is learning, assessment and teacher leading technology. Technology is a tool for developing 21st century skills students need now and in the future.
  - Both an executive summary and the full US Technology Plan can be found at http://www.ed.gov/technology/netp-2010/
- infoDev Monitoring and Evaluation of ICT Projects in Education
  - This document provides a good overview and factors that contribute to successful implementation of ICT projects through quality monitoring and evaluation.
  - The document can be downloaded at http://www.infodev.org/en/publication.9.html.
- One Laptop per Child (OLPC) program and the OLPC Orientation Workshop Workbook (Tuvalu)
  - Regardless if state DOEs adopt the OLPC project in its entirety, the OLPC model of interconnectivity of children, personal computers and potential for server based systems where students can still have access to relevant information without direct Internet access provides a workable approach to the FSM lack of direct Internet access for schools.
- The New Media Consortium - Horizon Report 2009 K – 12 Edition
  - The Horizon Reports are primarily directed at postsecondary education, but the 2009 K – 12 edition addresses current and short and long term trends in technology that have potential for impacting learning of students and provide a wealth of information on actual projects demonstrating use of technology. The Horizon reports and a new Horizon Report 2010 K -12 edition can be found at http://www.nmc.org/horizon/.
- Integrating Technology into the Classroom using Classroom Instruction that Works: Research-Based Strategies for Increasing Student Achievement by Robert J. Marzano, Debra J. Pickering, Jane E. Pollock
  - In line with the theme of learning, assessment and teaching learning technology, this book from former NCREL staff provides nine categories of instructional strategies that research have proven to increase student learning. The instructional strategies can be adopted for any grade level and subject area. Examples are provided with numerous web sites for use of technology to support and enhance the instructional strategy. The recommended strategies:
    1. Identifying similarities and differences
    2. Summarizing and note taking
    3. Reinforcing effort and providing recognition
    4. Homework and practice
    5. Nonlinguistic representation
    6. Cooperate e learning
    7. Setting objectives and providing feedback
    8. Generating and testing hypotheses

9. Cues, questions, and advance organizers

- Adult Micronesian Perceptions of College Classroom Environments by L. Robert Barber, Jr. (dissertation)
  - A recent (2009) dissertation by L. Robert Barber, Jr. of provides research on Micronesian Learning Environments. Additional detail can be found in the section on defining the need for change. A basic question to be answered at all levels of the FSM Education System – are our instruction approaches, strategies and instructional support materials appropriate for Micronesia learning styles?

ISTE NETS STUDENT, TEACHER AND ADMINISTRATOR/PRINCIPAL STANDARDS

The ISTE NETS standards are high level standards in that they focus on cognitive skill development as opposed to learning how to use ICT tools.

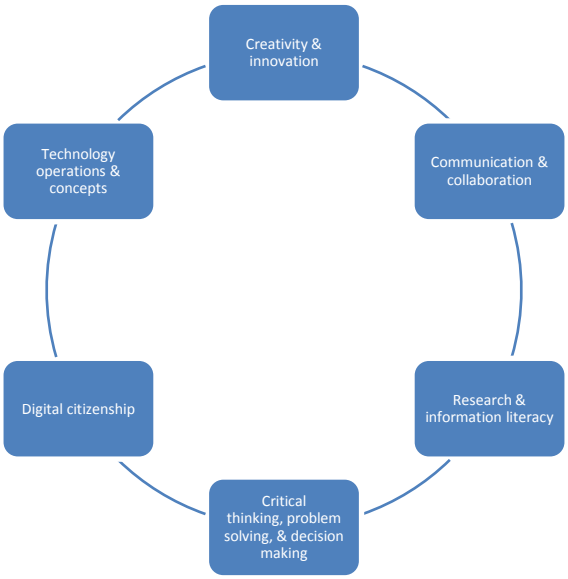

Figure 2 - ISTE NETS Standards for Students

The ISTE NETS Standards for Teachers focus on teachers providing the learning environments, model and support needed for transforming an education system from a teacher centered to a student – learning centered model.

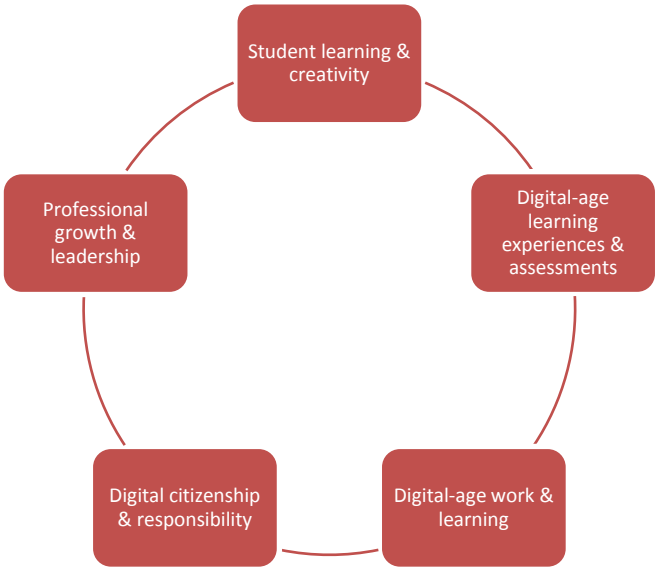

Figure 3 - ISTE NETS Standards for Teachers

The ISTE NETS Standards for Administrators/Principals focus on providing the creating learning environments

Figure 4 - ISTE NETS Standards for Administrators/Principals

One thing is very clear from the ISTE NETS standards – ICT cannot be implemented in isolation. It requires a coordinated long term effort from all segments of the education system that is committed to continuous improvement of the system and of their capacity, knowledge and skills.

ADB GOOD PRACTICE IN ICT FOR EDUCATION

The ADB found that the following guides increases the changes that an ICT program in the Asian Pacific Region will impact education in a positive matter.

Working Toward a National ICT Policy

- Focus on stakeholder buy-in by generating society's demand for ICT while addressing commonly held misconceptions about ICT.
- Adopt sector-wide approaches to relate to relevant sectoral policies
- Integrate "bottom-up" needs at the classroom level into the national ICT policy
- Establish a public-private partnership program
- Develop legal and regulatory systems supporting ICT development and usage
- Analyze infrastructure and content issues

Working Toward an ICT Plan for the Education Sector

- Identify true cost components necessary to support investment in ICT for education, and the true costs of running effective ICTG in education systems
    - Investment costs
    - Replacement costs
    - Recurrent costs
    - Associated costs
- Consider public-private partnerships for covering associated costs while providing expertise
- The teacher education curriculum should be relevant in terms of country context and should be designed for improving productivity, preparing teaching materials, and integrating technology into teaching
- ICT teacher training should be hands-on
- Professional development for school leaders should include skills development to take on technology leadership tasks in the school, pedagogical transformation, as well as the development of a school ICT culture. In essence they should be trained to become school technology leaders.
- A pro-equity approach should be employed in conducting M&E activates while concentrating on measures of student and teacher leaning.

Incorporating ICT at the Educational Institutional Level

- Instead of defining ICT for education in terms of technology literacy or information literacy, the concept of "ICT capability" should be understood and considered a definition of ICT for education
- Along with establishing informatics or computer education as a curricular subject, the overall school curriculum should be assessed to identify ways in which ICT may enhance learning both core subject areas and electives
- ICT for education encompasses low and high technologies
- IN an ICT supported learning environment, teachers need to act as guide to facilitate student-centered learning
- School leaders must communicate a vision for ICT in the school and foster an ICT culture that allows all school staff to be regular users of ICT
- M&E activities should measure the impact of ICT on the overall learning environment

FINDINGS

The following are the findings regarding the current status of ICT in the FSM Education System based on the national and state workshops, site visits to all FSM state departments of education and selected schools, surveys and interviews. The framework for the finding is based on the ADB Good Practice in ICT for Education.

- Technology (where it exists) has been primarily used in a parachute mode. Equipment is provided and expected to be used – this seems to apply to both national/state funded technology purchases and donor assistance.
- True costs of ICT are not being considered.
    - Investment costs – focus in on providing funds for technology – not its use or impact, additionally there is limited consideration given to issues such as wiring, furniture and classroom refurbishment.

    - Replacement costs – generally, there are limited or no plans for technology replacement – budgets are developed based on year to year needs with limited provision given for long term considerations and reprioritization/relocation between programs and services.
    - Recurrent costs – costs of items such as internet access, power and maintenance are not budgeted consistently across the FSM.
    - Associated costs – limited linkages are seen between technology and items such as teacher training, additional human resources, etc.
- Learning, assessment & teaching receive limited focus currently in relation to technology.
- Teachers have limited access to technology and the Internet.
- Students have limited access to technology and the Internet.
- Schools have limited Internet Access.
- Budgeting for Internet Access tends to be low and tends to be treated as a communications budgets.
- Donor assistance is providing equipment, technology and power to support technology (particular in the outer island) etc., but recurrent, replacement and associated costs are not being put in place.
- There is limited evidence of a coordinated Monitoring and Evaluation (M&E) system for technology in the school systems (best estimates are that 5 to 10% of time and resources should be devoted to M&E activities).
- Regarding data and data systems – while each state and the national government have data systems, the systems are often incompatible and there are sever questions regarding the accuracy and completeness of the data and information included. The problems with data and data collection have great impact on establishing and enhancing evidence based decision making systems in the FSM education system.
- There is limited evidence of any directed, coordinated Internet research being conducted by education departments.
- There is limited evidence of parental, community or stakeholder participation in ICT for schools.

IMPLEMENTING

MONITORING AND EVALUATION

The web introduction to infoDev Monitoring and Evaluation of ICT Projects in Education provides the following two questions:

(1) What is the impact on student achievement of introducing ICTs in educational settings in developing countries?

(2) How should this impact be measured, and what are the related issues, especially as they relate to 20 JEMCO Education Indicators, Education For All and other Millennium Development Goals and other learning and ICT indicators set by the FSM Education System?

ICT INDICATORS

Being able to answer these two and related questions are a critical element in planning and implementing a quality FSM Technology Plan and ICT projects at the national and state levels.

An essential aspect of monitoring in tracking of critical indicators related to technology and its use in the school system to enhance learning, assessment and teaching. A system must be set up to embellish baseline data and track improvement in the indicators. Additionally, yearly performance budgets and School Improvement Plans (SIP) should base their technology related outcomes/objectives around the indicators. The following indicators are adapted from a World Bank document[11] and are recommended to form the basis for FSM ICT indicators.

[11] Wagner, Daniel A., Bob Day, Tina James, Robert B. Kozma, Jonathan Miller and Tim Unwin. 2005. *Monitoring and Evaluation of ICT in Education Projects: A Handbook for Developing Countries*. Washington, DC: infoDev / World Bank. Available at: http://www.infodev.org/en/Publication.9.html

Some indicators of ICT-based access resources

- Availability of electricity
- Number of devices (computers, printers, projectors, etc.) per school (sorted by their technical characteristics)
- Number of students or teachers per device.
- Number of computers connected to the Internet and type of bandwidth
- Number of students/teachers using the Internet per school
- Number of pieces of educational software available for key subjects (mathematics, language and science) per school
- Investment in hardware and software per school
- Availability of digital measuring devices per school
- Availability of server based resource materials where direct Internet access is not feasible

Teacher training standards

- Teachers understand technology operations and concepts.
- Teachers plan and design effective learning environments supported by technology.
- Teachers can implement plans that include methods for applying technology to maximize student learning.
- Teachers can apply technology to facilitate assessment.
- Teachers can use technology to enhance their own productivity.
- Teachers understand the social, ethical, legal, and human
- issues related to the use of technology
- Teachers can perform basic repair and maintenance of ICT equipment

Pedagogical practices of teachers

- Students developing abilities to undertake independent learning
- Providing weaker students with additional instruction
- Organizing teaching and learning so that differences in entrance level, learning pace, and learning route are taken into account
- Students learning to search for information, process data, and present information
- Students being largely responsible for controlling their own learning progress
- Students learning and/or working during lessons at their own pace
- Students involved in cooperative and/or project-based learning
- Combining parts of school subjects with one another (multidisciplinary approach)
- Teachers coordinate learning strategies and learning environments to maximize impact on learning

Practices in the ICT-supported classrooms

- Collaborate on a project with other students in the same class
- Collaborate on a project with students from another school in the same country
- Collaborate on a project with students from another country
- Exchange information with students from another country
- Gather and analyze resource materials on a problem or topic
- Gather evidence to argue a position about an issue Use graphics in a report
- Collect information about another country or culture
- Draw conclusions or make predictions using data gathered or obtained from resource materials
- Communicate with parents or other members of the community about school activities

Some guidelines for customized assessments

- Test complex knowledge, not just the memorization of factual knowledge. Items should be designed to measure students' understanding of important concepts, principles, and problem- solving skills.

- At least some tasks should be similar to situations in which students might apply their knowledge in the real world outside the classroom. These tasks should be structured so that students exhibit their thought processes and problem solving skills. These are sometimes called performance assessments.
- It is appropriate to use ICT as part of the assessment. Tasks should have students use ICT tools to solve the problems and should provide information on ICT knowledge and skills, as well as their knowledge of school subjects.
- Information that comes from the assessment should not only describe what students know, but should provide program directors, teachers, and even students with information that they can use to improve the program and student learning. This would include the types of errors or misconceptions that students typically exhibited.
- Regular testing throughout the duration of the program, rather than just at the end, will allow evaluators to monitor the progress of the program, allow program staff and teachers to improve their learning.

General National indicators to track

- Total public expenditure on education
- Educational expenditures per student
- Relative proportion of public and private investment in educational institutions
- School enrollment rates at various levels
- Instructional time
- Class size and ratio of students to teaching staff

Specific to ICT for education

- Presence of a national educational ICT policy
- Presence of a master plan with a timeline
- National expenditure on ICT in education
- Ratio of students to computers
- Availability of computer networks in schools
- Integration of ICT into the curriculum
- Number of schools incorporating ICT

ICT PURCHSING, IMPROVEMENT AND ASSESSMETN PLANS AND ASSESSMENT REPORT

Purchases of ICT in the FSM must be based on a clearly defined plan for how the ICT tools will be used to support learning, assessment, teaching or productivity. The outline of this Tech Plan is recommended to be followed. The appendix contents recommended formats for improvement and assessment plans and assessment reports as well as purchasing and use patterns.

No ICT purchasing should be allowed without an approved improvement and assessment plan. Monitoring and evaluation should be based on the approved improvement and assessment plans. Future purchases and use of ICT should be based on the findings of the ICT assessment reports.

ESSENTIAL CONDITIONS FOR ICT TO SUCCEED

The ISTE in its recommendations for the NETS standards provide an overview of necessary conditions that are needed to support use of technology for learning. It is recommended for the FSM NDOE and each SDOE to periodically review its status against the essential conditions. The Essential Conditions are useful for both planning and implementation and assist in providing a framework for evaluation. The ISTSE Necessary Conditions to effectively leverage technology for learning

Essential Condition	Descriptor
Shared vision	Proactive leadership in developing a shared vision for educational technology
Empowered leaders	Stakeholders at every level empowered to be leaders in effecting change

Implementation planning	A systemic plan aligned with a shared vision for school effectiveness and student learning through infusion of information and communication technologies
Consistent and adequate funding	Ongoing funding to support technology infrastructure, personnel, digital resources, and staff development
Equitable access	Robust and reliable access to current and emerging technologies and digital resources, with connectivity for all students, teachers, staff and school leaders
Skilled personnel	Educators, support staff, and other leaders skilled in the selection and effective use of appropriate ICT resources
Ongoing professional learning	Technology-related professional learning plans and opportunities with dedicated time to practice and share ideas
Technical support	Consistent and reliable assistance for maintaining, renewing, and using ICT and digital learning resources
Curriculum framework	Content standards and related digital curriculum resources that are aligned with and support digital-age learning and work
Student-centered learning	Planning, teaching and assessment centered around the needs and abilities of students
Assessment & evaluation	Continuous assessment of teaching, learning, and leadership, and evaluation of the use of ICT and digital resources
Engaged communities	Partnerships and collaboration within communities to support and fund the use of ICT and digital learning resources
Support policies	Policies, financial plans, accountability measures, and incentive structure to support the use of ICT and other digital resources for learning n the district school operations
Supportive external context	Policies and initiative at the national, regional, and local levels to support schools and teacher preparation programs in the effective implementation of technology for achieving curriculum and learning technology standards

MISSION, VISION AND GOALS FOR SUCCESS

MISSION

The FSM education system will ensure equitable access and a system for meaningful use of educational technology for the academic and vocational achievement of 21st century skills for all students.

VISION & PHILOSOPHY

Students' learning will be engaging and empowering through ICT based educational opportunities. Students will become responsible life-long learners, competent in 21st century skills, and active local and global citizens.

ICT supports learning when its use is planned, implemented and evaluated with quality. ICT is a set of tools that when incorporated and used properly can enhance and expand learning experiences by opening opportunities for expanded learning strategies, environments and access to information and communication sharing locally and globally.

GOALS FOR SUCCESS

Goal 1: LEARNING - With the assistance of ICT, FSM learners will have engaging and empowering learning experiences that prepare them to be active, creative, knowledgeable, and ethical participants in our local and globally networked society.

Objective 1.1: The FSM education system adopts the ISTE NETS standards for students as the FSM ICT Standards for Education (FSM ICTSE).

Objective 1.2: The ISTE NETS standards for students will be implemented through existing content areas and curriculum.

Goal 2: ASSESSMENT – The education system will leverage the potential of technology to measure what matters and use assessment data for continuous improvement.

Objective 2.1: Design, develop, and adopt assessments that use technology to give students, educators, and other stakeholders' timely and actionable feedback about student learning to improve achievement and instructional practices.

Objective 2.2: Build the capacity of educators and educational institutions to use technology to improve assessment materials and processes for both formative and summative uses.

Goal 3: TEACHING – FSM educators will be supported individually and in teams by technology that connects them to data, content, resources, expertise, and learning experiences that enable and inspire more effective teaching for all learners

Objective 3.1: Design, develop, and adopt technology-based content, resources, and online learning communities that create opportunities for educators to collaborate for more effective teaching, inspire and attract new people into the profession, and encourage our best educators to continue teaching.

Objective 3.2: Provide pre-service and in-service educators with preparation and professional learning experiences powered by technology that close the gap between students' and educators' fluencies with technology and promote and enable technology use in ways that improve learning, assessment, and instructional practices.

Goal 4: INFRASTRUCTURE - All students and educators will have access to a comprehensive ICT infrastructure for learning when and where they need it.

Objective 4.1: Seek solutions to have the flexibility to Internet connectivity and/or server based connectivity for every major educational facility and school in the FSM education system.

Objective 4.2: Seek solutions to have the flexibility to have inter-connectivity between teachers and students at the school site.

Objective 4.3: Develop a purchasing and inventory process for tracking ICT equipment and its use

Objective 4.4: Develop mechanisms to assume reoccurring costs for donor ICT assistance

Goal 5: PRODUCTIVITY - The FSM education system at all levels will redesign processes and structures to take advantage of the power of technology to improve learning outcomes while making more efficient use of time, money, and staff.

Objective 5.1: Enhance data collection, analysis and reporting through use of appropriate software and ICT tools that tracks and reports enrollment and student achievement and other key performance indicators in a timely, accurate manner

Objective 5.2: Develop, track and report key performance indicators for ICT

Objective 5.3: Reestablish a research and development cadre composed of state, national and COM-FSM staff to address critical research and reporting of information necessary for increasing student learning and productivity of staff

Objective 5.4: Develop a realistic budgeting plan for ICT

Objective 5.5: Adopt the NETS Standards for Administrators/Principals as a guide to improving productivity

Objective 5.6: Adopt a central monitoring and evaluation system that ensures tracking of program activities are occurring in a timely manner and being evaluated to ensure quality of programs and services.

UNDERLYING IDEOLOGY OF GOALS FOR SUCCESS

ICT does not operate in isolation. Technology must support learning, assessment, teaching and productivity and untimely the success of any ICT project must be based on its impact on student learning and achievement.

Teachers facilitate student learning through the use of ICT that stimulate thinking, build curiosity, create connections, and generate long lasting knowledge through issues that matter to students. Observers will see students working collaboratively to solve real-world problems through teamwork and hands-on activities. Teacher's guide and coach students in the creation of unique products that show deep student understanding of complex concepts. The FSM ICTSE instructional model requires conscious alignment of curriculum, professional development initiatives, technology acquisitions, and school vision. Also needed are collaborative leadership practices and school structures that support the school's professional learning community in the implementation of the FSM Tech Plan.

Incorporating ICT to support learning with quality will assist students in obtaining 21st Century Skills[12]. 21st Century Skills emphasize cognitive skills combined with fundamental subjects and life and career skills. The following are from the 21st Century Skills web site.

Core Subjects and 21st Century Themes

Mastery of **core subjects and 21st century themes** is essential to student success. Core subjects include English, reading or language arts, world languages, arts, mathematics, economics, science, geography, history, government and civics. In addition, schools must promote an understanding of academic content at much higher levels by weaving **21st century interdisciplinary themes** into core subjects:

- **Global Awareness**
- **Financial, Economic, Business and Entrepreneurial Literacy**
- **Civic Literacy**
- **Health Literacy**
- **Environmental Literacy**

Learning and Innovation Skills

Learning and innovation skills are what separate students who are prepared for increasingly complex life and work environments in today's world and those who are not. They include:

- **Creativity and Innovation**
- **Critical Thinking and Problem Solving**
- **Communication and Collaboration**

Information, Media and Technology Skills

Today, we live in a technology and media-driven environment, marked by access to an abundance of information, rapid changes in technology tools and the ability to collaborate and make individual contributions on an unprecedented scale. Effective citizens and workers must be able to exhibit a range of functional and critical thinking skills, such as:

- **Information Literacy**
- **Media Literacy**
- **ICT (Information, Communications and Technology) Literacy**

[12] See The Partnership for 21st Century Skills at www.p21.org for additional information on what skills are needed to succeed in the 21st Century.

Life and Career Skills

Today's life and work environments require far more than thinking skills and content knowledge. The ability to navigate the complex life and work environments in the globally competitive information age requires students to pay rigorous attention to developing adequate life and career skills, such as:

- **Flexibility and Adaptability**
- **Initiative and Self-Direction**
- **Social and Cross-Cultural Skills**
- **Productivity and Accountability**
- **Leadership and Responsibility**

21 Century Support Systems

Developing a comprehensive framework for 21st century learning requires more than identifying specific skills, content knowledge, expertise and illiteracies. An innovative support system must be created to help students master the multi-dimensional abilities that will be required of them. The Partnership has identified five critical support systems to ensure student mastery of 21st century skills:

- **21st Century Standards**
- **Assessments of 21st Century Skills**
- **21st Century Curriculum and Instruction**
- **21st Century Professional Development**
- **21st Century Learning Environments**

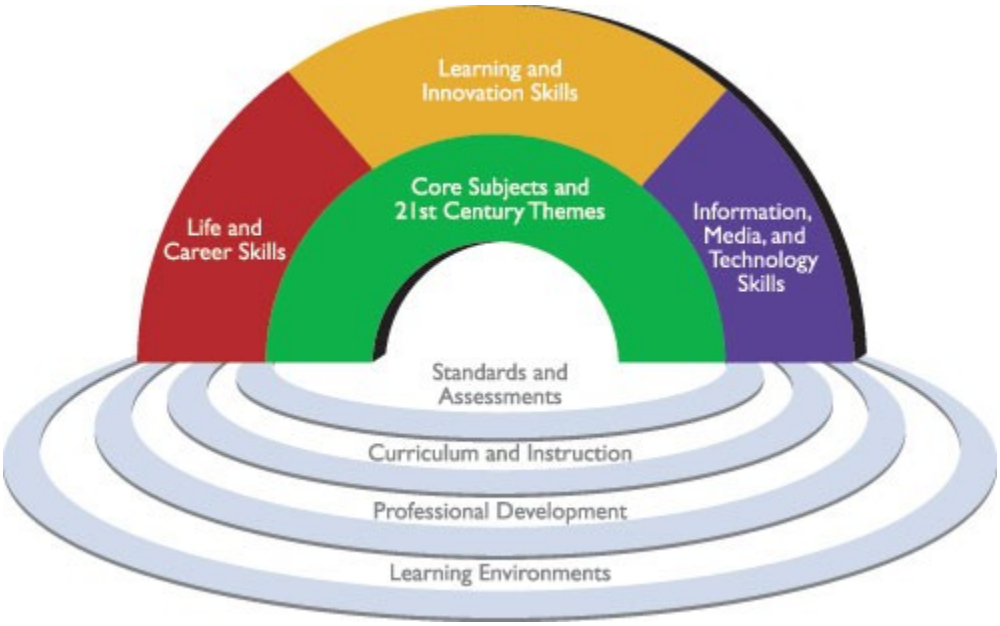

Figure 5 - Framework for 21st Century Learning

GOAL 1: LEARNING

GOAL STATEMENT

With the assistance of ICT, FSM learners will have engaging and empowering learning experiences that prepare them to be active, creative, knowledgeable, and ethical participants in our local and globally networked society.

RATIONALE

ICT is used in this plan to indicate the full range of Information and Communications Technology (ICT) that provides interconnectivity on the local and global level. Learning occurs in and out of school. ICT can provide tools that facilitate the learning experience. ICT does not and cannot solve all the problems facing the FSM education system, but it can substantially support current practices and new directions in learning if properly planned, supported, integrated into the curriculum, implemented and evaluated.

ICT can assist in supporting the networking and interconnectivity elements of Micronesian society. ICT can also allow the networking and interconnectivity skills that Micronesians develop as children into linking with broader national and global societies in the 21st century. ICT can enhance the learning of experiences of students anytime and anyplace.

The needed skill set for students is changing. In the 21st century, emphasis has to be on creative thinking, problem solving, collaborative and cooperative approaches along with fundamental, personal management and team working skills. Additional information can be found at the Partnership for 21st Century Skills http://p21.org/. The education system will leverage the potential of technology to measure what matters and use assessment data for continuous improvement.

ICT can support the transformation of learning environments described in the section on building the FSM Technology Plan K – 12 above. ICT implementation must take into account Micronesian Learning Environments. A fundamental practice in education is that learning occurs best when the learning styles and preferred learning environments of students are taken into account in design and delivery of instructional strategies and resource materials selection and development.

The FSM Education System is built on national and state content standards. This plan has adopted the International Society for Technology in Education (ISTE) National Education Technology Standards (NETS). Information on the standards and support for implementation of those standards can be found at http://www.iste.org/AM/Template.cfm?Section=NETS.

BENEFITS FOR LEARNING

- Students will use current technologies that support learning.
- Students will use current technologies that are engaging and empowering and fit with Micronesian learning styles and environments.
- Students will be able to develop 21st century skills needed for personal growth and development as well as for development of the FSM.
- There will be increased and ongoing dialog between schools to ensure that the states and nation as a whole are heading in the same direction.
- Provide a standard based approach to implementing technology into the education system.
- Provide a basis for formative and summative evaluation.

REALITY IN THE FSM

- Learning, assessment and teaching receive limited focus in terms of technology.

- Technology use is approached in isolation or a parachute mode and not from an ICT standpoint.
- Students and teachers have limited or no access to the Internet.
- Levels of technology penetration vary significantly across the four states. Highest levels of penetration are seen in Yap & Kosrae. Chuuk has the lowest levels of penetration.
- Technology where it exists is often focused on administrative use or use of the computer or specific computer programs.
- Teacher and staff perceptions of technology focus more on the use of computers to learn how to use computers not on ICT support for learning.
- ICT has limited impact on development of lesson plans and identification of resource materials.
- Internet access is generally limited to central offices and selected schools.

OBJECTIVE 1.1: STUDENT TECHNOLOGY STANDARDS

The FSM education system adopts the ISTE NETS standards for students as the FSM ICT Standards for Education (FSM ICTSE).

Strategies	Responsible	Timeline[13]	Resources	Indicators
1.1.1 The FSM ICTSE standards will be widely distributed through multi-media modes including placement on NDOE, SDOEs and college web sites and print copies distributed to all schools.	Webmasters NDOE, SDOE & COM-FSM; NDOE & SDOE for print versions	September – December 2010	Printing costs	Number of classrooms with FSM ISTE NETS Standards
1.1.2 A public information campaign will be developed and implemented to promote awareness of the FSM ICTSE standards to stakeholders.	COM-FSM for basic design; NDOE & SDOE for modification and implementation	Design September 2010; Implementation SY 2010/11 &	Human resources & transportation costs	Survey of participants in ICT awareness workshops and information dissemination
1.1.3 The FSM ICTSE standards will be incorporated into training plans for teachers, administrators/principals and stakeholders and should be referenced for training in training for content area instruction.	COM-FSM for sample plans; NDOE & SDOE Curriculum Chiefs and Training Coordinators	September 2010 for sample plans and ongoing thereafter as training occurs	Current budgets for training	Per cent of training plans incorporating FSM ICT Standards

OBJECTIVE 1.2: STANDARDS IMPLMENTATION STRATEGY

The ISTE NETS standards for students will be implemented through existing content areas and curriculum.

Strategies	Responsible	Timeline	Resources	Indicators
1.2.1 Identify where FSM ICTSE standards support existing content areas and curriculum at all grade levels.	NDOE & SDOEs Curriculum Chiefs and Subject Area Specialists	September – December 2010	Human Resources	Survey of curriculum standards and lesson plans incorporating FSM ICT Standards

[13] **Timelines in all cases for outer islands of Chuuk, Pohnepi & Yap will be dependent upon travel schedule of field trip vessels and means of travel to outer island.**

1.2.2 Identify ICT tools and strategies that support instructional approaches and strategies that fit Micronesian learning styles and learning environments. Recommended focus is for use of OLPC approaches and NCREL's[14] researched based instructional strategies: 1. Identifying similarities and differences 2. Summarizing and note taking 3. Reinforcing effort and providing recognition 4. Homework and practice 5. Nonlinguistic representation 6. Cooperate e learning 7. Setting objectives and providing feedback 8. Generating and testing hypotheses 9. Cues, questions, and advance organizers	COM-FSM for models and NDOE & SDOEs Curriculum Chiefs, ICT and Subject Area Specialists for specifics; Teachers & Principals for recommendations on effectiveness	September – December 2010	Human Resources	Per cent of lesson plans incorporating ICT
1.2.3 Identify strategies and mechanisms to increase the availability of ICT tools and strategies to all segments of the FSM education system	COM-FSM for models and NDOE & SDOEs Curriculum Chiefs, ICT and Subject Area Specialists for specifics; Teachers & Principals for recommendations on effectiveness	September – December 2010	Human Resources	Per cent of schools and classrooms with ICT access
1.2.4 Delivery training on ICT tools and strategies that support instructional approaches and strategies to teachers, administrator/principals and stakeholders.	1)COM-FSM Initial Training 2) NDOE & SDOEs Curriculum, Elementary and Secondary Chiefs, ICT and Subject Area Specialists & Training Coordinators	1) September – October 2010 2) September – December 2010 initial training and periodic retraining thereafter	1) FSM Tech Plan contract budget 2) Human resources and current budgets for training	Per cent of ICT training participants incorporating instructional strategies into lesson plans and assessment
1.2.5 Use ICT tools and strategies as a spring board for transformation of the learning environments in the FSM	1)COM-FSM Initial Training	1) September – October 2010	1) FSM Tech Plan contract budget	Per cent of classroom instruction using

[14] See Integrating Technology into the Classroom using Classroom Instruction that Works: Research-Based Strategies for Increasing Student Achievement by Robert J. Marzano, Debra J. Pickering, Jane E. Pollock

through emphasis on: 1.2.5.1 Student-centered, performance focused learning 1.2.5.2 Collaborative work on authentic, real-world projects 1.2.5.3Learner-constructed knowledge from multiple information sources and experiences 1.2.5.4 Media-rich, multisensory stimulation 1.2.5.5 Creative thinking for innovation and original solutions 1.2.5.6 Digital illiteracies and communication skills	2) Teachers & Principals, NDOE & SDOEs Curriculum, Elementary and Secondary Chiefs, ICT, Subject Area Specialists & Training Coordinators	2) September – December 2010 initial training and periodic retraining thereafter	2) Human resources and current budgets for training	ICT to provide student and learning centered instruction

GOAL 2: ASSESSMENT

GOAL STATEMENT

The education system will leverage the potential of technology to measure what matters and use assessment data for continuous improvement.

RATIONALE

Sound student and learning centered assessment data provides the foundation for evidence based decision making and a quantitative basis for goal setting that leads to continuous improvement.

BENEFITS FOR LEARNING

"The model of 21st century learning requires new and better ways to measure what matters, diagnose strengths and weaknesses in the course of learning when there is still time to improve student performance, and involve multiple stakeholders in the process of designing, conducting, and using assessment. In all these activities, technology-based assessments can provide data to drive decisions on the basis of what is best for each and every student and that in aggregate will lead to continuous improvement across our entire education system." US National Technology Plan 2010

REALITY IN THE FSM

- The NDOE and SDOEs conduct extensive summative student testing through the National Standardized Test (NST) and various state developed and administered student achievement test.
- Analyzed data is seldom used to set individual classroom, school, department or national goals for improvement. Additionally, instructional interventions are not based on identified strengths and weaknesses of students.
- Student assessment data is often perceived to be unavailable at the school level.
- Student assessment data is not combined with learning systems. There is not sufficient information on learning strategies and support systems in use where students either score high or low to determine the effectiveness of instructional strategies and learning environments.
- The primary feedback on student assessment to parents and stakeholders is through report cards which often do not reflect the actual level of student learning or progression against grade level performance expectations.
- The emphasis of student testing programs in the FSM is on summative assessment of students.

OBJECTIVE 2.1:

Design, develop, and adopt assessments that use technology to give students, educators, and other stakeholders' timely and actionable feedback about student learning to improve achievement and instructional practices.

Strategies	Responsible	Timeline	Resources	Indicators
2.1.1 The FSM Technology Advisor Committee (R & D) cadre will research and recommend appropriate ICT based assessment tools appropriate for the FSM Education System.	The FSM Technology Advisor Committee (R & D) cadre	Quarterly	ICT & potentially travel costs	Per cent of assessment based on cadre recommendations
2.1.2 Provide training and retraining for use and analysis of ICTSE assessment tools impact on assessing student and teacher learning and interactions with	NDOE & SDOEs Curriculum, Elementary and Secondary	September – December 2010 initial training and	Human resources and current budgets for	Per cent of training participants using ICTSE assessment

parents, community and stakeholders.	Chiefs, ICT, Principals, Subject Area Specialists & Training Coordinators	periodic retraining thereafter	training	tools in classrooms and at school level assessment

OBJECTIVE 2.2:

Build the capacity of educators and educational institutions to use technology to improve assessment materials and processes for both formative and summative uses.

Strategies	Responsible	Timeline	Resources	Indicators
2.2.1 Develop and replicate programs that use technology to provide formative assessment of students that can be used to design interventions in real time to keep student on progress to achieve performance expectations.	NDOE & SDOEs Curriculum, Elementary and Secondary Chiefs, ICT, Principals, Subject Area Specialists & Training Coordinators; R & D cadre for review and recommendations	Ongoing	Various – depending on program design to be replicated	Per cent of assessment supported by ICTSE assessment tools
2.2.2 Provide ongoing training at all levels of the education system on use of technology for improved analysis of available data and identification of strengths and weaknesses and development of priorities for developing interventions. See appendix D for training plans.	See Appendix D for training plans	See Appendix D for training plans	See Appendix D for training plans	Per cent of teachers, staff and parents participating in training activities
2.2.3 Design and implement secure storage facilities	NDOE & SDOE ICT	September 2010 – July 2011	Hardware, software and infrastructure modification	Per cent of schools and departments having secure storage facilities
2.2.4 Improve timely distribution of assessment reports and analysis to students, teachers, parents, community and stakeholders through establishment of a web based portal for assessing student and teacher learning in the FSM.	NDOE & SDOE evaluation specialists supported by Chiefs of Curriculum, Elementary, & Secondary; subject area specialists	September 2010 – July 2011 and ongoing thereafter	Hardware, software, human resources	Per cent of teachers and schools having direct and timely access to assessment data and reports

GOAL 3: TEACHING

GOAL STATEMENT

FSM educators will be supported individually and in teams by technology that connects them to data, content, resources, expertise, and learning experiences that enable and inspire more effective teaching for all learners.[15]

RATIONALE

ICT does not replace the face to face learning assistance provided by a quality teacher, but rather enhances and provides mechanisms for creating learning environments that allow self paced learning either individually or in groups, avenues for increased cooperation and collaboration among students and teachers, and increases avenues for sharing of best practices, lesson plans, resource materials, assessment tools among and between teachers. ICT can also offer avenue for both formal distance learning and informal development of teacher skills.

BENEFITS FOR LEARNING

ICT can assist teachers with:

- Developing and applying teaching skills through distance learning, self paced learning or collaborative learning
- Developing and applying ICT assessment skills
- Developing and applying ICT communications and social networking skills
- Opening opportunities for cooperation and collaboration among teachers at a school site, across the state, nation and around the world
- Opening access to lesson plans, resource materials, assessment tools that can be adapted for use in the FSM Education System.

REALITY IN THE FSM

Limited access of teachers to the Internet has inhibited all aspects of ICT impact on improving teaching and learning and assessing learning environments that encourage student learning.

OBJECTIVE 3.1: TEACHER TECHNOLOGY STANDARDS

The FSM education system adopts the ISTE NETS standards for Teacher as the FSM ICT Standards for Education (FSM ICTSE).

Strategies	Responsible	Timeline[16]	Resources	Indicators
3.1.1 The FSM ICTSE standards will be widely distributed through multi-media modes including placement on NDOE, SDOEs and college web sites and print copies distributed to all schools.	Webmasters NDOE, SDOE & COM-FSM; NDOE & SDOE for print versions	September – December 2010	Printing costs	Number of classrooms with FSM ISTE NETS Standards
3.1.2 A public information campaign will be developed and implemented to promote awareness of the FSM ICTSE standards to stakeholders.	COM-FSM for basic design; NDOE & SDOE for modification	Design September 2010; Implementation	Human resources & transportation costs	Survey of participants in ICT awareness workshops and

[15] This teaching section relies heavily on the US National Technology Plan 2010.

[16] **Timelines in all cases for outer islands of Chuuk, Pohnepi & Yap will be dependent upon travel schedule of field trip vessels and means of travel to outer island.**

	and implementation	SY 2010/11 &		information dissemination

OBJECTIVE 3.2: ONLINE CONTENT, RESORUCES, LEARNING COMMUNITIES

Design, develop, and adopt technology-based content, resources, and online learning communities that create opportunities for educators to collaborate for more effective teaching, inspire and attract new people into the profession, and encourage our best educators to continue teaching.

Strategies	Responsible	Timeline	Resources	Indicators
3.2.1 Develop a FSM web site that creates opportunities for educators to communicate for more effective teaching including social networking and provides an interactive depository for educational resources and links to quality teaching and learning web sites around the world	Webmasters NDOE, SDOE & COM-FSM; NDOE & SDOE for print versions	September – December 2010	Human and financial resources`	Number of national and state educational web sites that support ICT improved teaching and interaction
3.2.2 Ensure access of ICT technologies, information and learning resources and to all teachers in the FSM through high and low technologies available in the FSM	Secretary NDOE, SDE's, NDOE & SDOEs Curriculum, Elementary and Secondary Chiefs, ICT, Principals, Subject Area Specialists	Budget 2011 and annually	Human and financial resources	Tracking of ICT penetration into schools and classrooms in the FSM including outer islands and remote schools

OBJECTIVE 3.3:

Provide pre-service and in-service educators with preparation and professional learning experiences powered by technology that close the gap between students' and educators' fluencies with technology and promote and enable technology use in ways that improve learning, assessment, and instructional practices

Strategies	Responsible	Timeline	Resources	Indicators
3.3.1 Provide pre-service training that incorporates ICTSE Standards for Students, Teachers and Administrators/Principals in course and program content	COM-FSM Education Programs and NDOE and SDOE training for new teachers	Annually	Program revision redesign	Review of per-service program outcomes and course outlines for evidence of ICTSE Standards
3.3.2 Incorporate ICTSE Standards incorporates ICTSE Standards for Students, Teachers and Administrators/Principals in teacher certification systems	Secretary NDOE & FACSSO	September 2010 – July 2011	Human resources	Review of FSM teacher certification system certification requirements
3.2.3 Provide ongoing training that assists teachers with identification and application of appropriate ICT tools	NDOE & SDOEs Curriculum, Elementary and	September – December 2010 initial	Human resources and current	Per cent of teachers incorporating

(equipment, software, learning communities, distance learning, resource materials, assessment tools, etc.)	Secondary Chiefs, ICT, Principals, Subject Area Specialists & Training Coordinators	training and periodic retraining thereafter	budgets for training	new ICT tools into learning activities

OBJECTIVE 3.4:

Use technology to provide access to the most effective teaching and learning resources, especially where they are not otherwise available, and to provide more options for all learners at all levels.

Strategies	Responsible	Timeline	Resources	Indicators
3.4.1 Provide training for teachers and staff to develop Internet search skills to identify learning resources	NDOE & SDOEs Curriculum, Elementary and Secondary Chiefs, ICT, Principals, Subject Area Specialists & Training Coordinators	September – December 2010 initial training and periodic retraining thereafter	Human resources and current budgets for training	Per cent of teachers incorporating ICT into instructional activities
3.4.2 Provide support and training for teachers in areas where direct Internet access is unavailable including server based resources materials located at individual schools.	NDOE & SDOEs Curriculum, Elementary and Secondary Chiefs, ICT, Principals, Subject Area Specialists & Training Coordinators	September – December 2010 initial training and periodic retraining thereafter	Human resources and current budgets for training	Number and type of server based materials provided to remote and outer island schools

GOAL 4: INFRASTRUCTURE

GOAL STATEMENT

All students and educators will have access to a comprehensive ICT infrastructure for learning when and where they need it.

RATIONALE

Access to a comprehensive ICT infrastructure will support learning by:

- Ensuring ICT tools such as computers, networks, servers, electricity, and support structures are in place to assist students, teachers, principals, parents and the community in improving the learning environment for students and teachers.
    - Allow students access to information and resources for self paced or group learning.
    - Allow teachers to design learning environments that focus on individual and groups of students needs for learning.
- Communication technologies increase the ability of students and teachers to interact among and between themselves, with parents and the community and with the broader state, national and international education systems.
    - Allow cooperative and collaborative work and projects that cross school, state and national boundaries.
    - Improves communications possibilities with students, parents and the community.

The OLPC model is based on a ratio laptop per child with support from a local server over a wireless network. The model provides for peer to peer connectivity and if Internet connectivity is present, opportunities to interact with student around the world. Detailed information on the OLPC approach is found the OLPC workbooks on the college web site at http://www.comfsm.fm/national/administration/VPA/researchdocs/techPlan/OLPC%20Orientation%20Workshop%20Workbook%20%28Tuvalu%29.pdf.

In addition to the OLPC type setup, for computer labs and offices, we recommend the use of thin client type setups.

Thin clients are computing devices that function as an access device on a network. These solid-state devices connect over a network to a server where the bulk of the processing takes place. Thin clients have no hard drive, allowing for more secure storage of data and applications on the server. Keystrokes, mouse events and screen images are all that is sent between the client and server. This makes the device much more secure than a standard desktop or notebook computer.

With no hard drive, fan or other moving parts, thin clients have a much longer lifespan than standard computers and use significantly less power. Lower maintenance costs are another benefit as software application updates, virus scanning and patches can be executed on the server. Deployment costs are also reduced as thin clients can be remotely configured and do not need to be set up individually. Break-fix simply requires replacing the thin client.

Unlike a traditional desktop or notebook computer, no applications or data are stored locally on the thin client. This makes them easy to replace if lost, stolen or damaged. With thin client access devices, business continuity is a given in the event of a natural disaster, as the data and applications are not resident on the client device. Thin clients are ideal for environments unsuited for traditional desktop computers like dusty, remote or space-constrained environments. Thin clients offer significant savings in power usage over traditional desktops. This is realized not only in energy costs but reduced air-conditioning costs in some cases. With their long lifecycle thin clients allow companies to achieve energy savings targets and reduce the need for replacement equipment.

BENEFITS FOR LEARNING

A quality ICT infrastructure allows an expansion of responsibilities for creating learning environments to promote student learning and achievement of 21st century skills.

REALITY IN THE FSM

Improvement of ICT infrastructure as in other areas is hampered by a lack of sufficient Internet connectivity (bandwidth) at a reasonable cost, lack of and reliability of electricity, transportation costs and availability, and basic communication access to school sites.

ICT infrastructure is hampered by lack of purchasing policies and understanding of ICT basics as to what are appropriate specification for various ICT tools such as computers and servers. Also affecting this area is lack of adequate manpower and training/retraining of staff for meeting repair and maintenance needs – especially in remote and outer island environments.

The true cost of implementing quality ICT support for student and teacher learning and enhance productivity in a school system is dependent on many factors, including the age of the building, the availability of electrical service, the availability of network services, and equipment that may already be available. A full accounting of the true costs (equipment purchase costs, replacement equipment costs, Internet access, maintenance and repair, training and retraining, etc.) must be considered in the design and implementation of ICT programs and projects

There is currently a wealth of ICT donor assistance such as EU solar power systems for outer islands, RICS, APT Telecenters, OLPC, disaster related communications, US federal education programs, etc. that can be accessed by the FSM Education System. However, there is limited evidence of policies and procedures in place to continue funding of reoccurring costs (replacement ICT equipment, Internet access, training and retraining, maintenance and repair, etc.). Currently the ICT donor assistance is often in parachute mode – equipment and other assistance is provided without evidence that there is a plan for how the assistance will be continued or how it will affect learning of students and teachers.

Over the years, government acquisition of ICT computer hardware and application software has been random across many offices, lacking government wide-standards and procurement policies. Most offices lack in-house expertise and purchases of equipment are not based on requirements but more on what is available from local or outside vendors often resulting in unnecessary cost and failures. Typically, we have an unnecessary high turn-over rate of costly equipment. The same comments are true of external ICT contractual assistance for data systems development, setup and operation of ICT systems – too much has been paid for systems and assistance that do not fit the needs of the FSM Education System.

Most computers are minimally utilized, mostly as word processors. There are centralized databases that are not used to their full potential, resulting in isolated information sources requiring physical journey between offices or islands to obtain or disperse information.

OBJECTIVE 4.1: CONNECTIVITY

Seek solutions to have the flexibility to Internet connectivity and/or server based connectivity for every major educational facility and school in the FSM education system.

Strategies	Responsible	Timeline	Resources	Indicators
4.1.1 SDOEs to develop implementation sequence for school based Internet access at rates specified in the table	SDE, SDOEs Curriculum, Elementary and	September 2010 – July 2011	Human resources	Implementation sequence development

below	Secondary Chiefs, ICT, Principals & Budget officer			and tracked
4.1.2 Wireless systems based on a minimum of 11 mbps transfer rate will be established as part of the network access distribution (note- a server – wireless network is also recommended for schools without direct Internet access. Using the OLPC model, instructional and support materials can be placed on the server for local access by students and teachers)	SDE, SDOEs Curriculum, Elementary and Secondary Chiefs, ICT, Principals & Budget officer	September 2010 – July 2013	Human & financial resources	Per cent of schools with wireless systems

Table 8 - Minimum Internet Access Based on School Size

School size	<=50	51 – 100	101-200	201-300	301-500	501-1000	1000+
Minimum connectivity recommendation	256 kbps	512 kbps	1024 kbps	1024 kbps	1 mbps	1 mbps	1 mbps

OBJECTIVE 4.2: INTER- CONNECTIVITY

Seek solutions to have the flexibility to have inter-connectivity between teachers and students at the school site.

Strategies	Responsible	Timeline	Resources	Indicators
4.2.1 Using the OLPC or thin client model, implement server based systems at all schools for high speed local access among and between students, teachers and the community and information sources	SDE, SDOEs Curriculum, Elementary and Secondary Chiefs, ICT, Principals & Budget officer	September 2010 – July 2013	Human & financial resources	Per cent of schools with server based systems
4.2.2 Design and implement a ethical system for research and preparation of materials (best instructional practices, lesson plan, instructional resource materials, local and international news, assessment tools, software, etc.) for placement on local servers that incorporate effort of central office staff, principals, and teachers	COM-FSM for models and NDOE & SDOEs Curriculum Chiefs, ICT and Subject Area Specialists for specifics; Teachers & Principals for recommendations on effectiveness	September 2010 – July 2011	Human Resources	Number and type of materials available for placement on school servers

OBJECTIVE 4.3: PURCHASING & INVENTORY OF ICT, SYSTEM DEVELOPMENT AND UPKEEP

Develop a purchasing and inventory process for tracking ICT equipment and its use

Strategies	Responsible	Timeline	Resources	Indicators
4.3.1 Require an approved use and assessment plan prior to all ICT purchases	1) ICT requestor for plan	Ongoing	Human resources	Per cent of ICT purchase with

(hardware and software) see appendix E for format and a maintenance/repair plan	2) Approval by SDE based on review by appropriate staff include ICT			approved use and assessment plans
4.3.2 Base ICT purchasing on criteria found in appendix G	Appendix G	Appendix G	Appendix G	
4.3.3 Adopt an inventory process as described in appendix F.	Appendix F	Appendix F	Appendix F	
4.3.4 Ensure prior to purchase that necessary electrical and housing needs are meet	Chiefs of Elementary & Secondary, ICT	Ongoing	Human and financial resources	
4.3.5 Ensure training in basics of ICT equipment maintenance/repair is provided to all teachers and staff and advanced training provided to selected teachers and staff	NDOE & SDOEs Curriculum, Elementary and Secondary Chiefs, ICT, Principals, Subject Area Specialists & Training Coordinators	September – December 2010 initial training and periodic retraining thereafter	Human resources and current budgets for training	Per cent of teachers and staff receiving basic training in ICT equipment maintenance and repair
4.3.6 Develop Policy for expert assistance in design and review of RFPs for ICT consultant assistance for system development including databases or data systems, set up and operation of ICT equipment, etc.	COM-FSM for design; NDOE & SDOEs for revision & adoption	September – December 2010 for design & adoption; ongoing thereafter	Human resources	Per cent of RFPs for ICT equipment following expert review criteria
4.3.7 Fully fund necessary personnel and support for maintenance and repair of ICT tools and equipment	SDE, SDOEs Curriculum, Elementary and Secondary Chiefs, ICT, Principals & Budget officer	September 2010 – July 2013	Human & financial resources	Number of DOEs having adequate ICT support and maintenance personnel

OBJECTIVE 4.4: DONOR ASSISTANCE REOCCURRING COSTS AND UPKEEP

Develop mechanisms to assume reoccurring costs for donor ICT assistance

Strategies	Responsible	Timeline	Resources	Indicators
4.4.1 Identify reoccurring costs for donor assistance for ICT including EU solar power, RICS, OLPC, APT Telecenters, and other local and International donor and identity necessary funding to assume reoccurring costs for identified projects at the end of donor assistance.	ICT & Budget Officer for identification and Secretary NDOE & SDEs with key staff for funding	Ongoing	Human resources	Per cent of donor assistance programs that have identified reoccurring costs identified and plans for program continuation

4.4.2 Develop policy regarding acceptance or decline of ICT donor assistance that includes ability to finance reoccurring costs at the end of donor assistance and ensure that ICT donor assistance has an approved use, assessment and long term maintenance/repair plan.	1) COM-FSM provide possible models 2) FACSSO revise and/or development & adopt	1)September – October 2010 2) November 2010 – March 2011	Human resources	ICT donor assistance policies in place at national and state levels

OBJECTIVE 4.5: ACCESS OF STUDENTS AND TEACHERS TO ICT

Implement purchase and support plans to meet indicators for the ratio of ICT tools and access for students and teachers

Strategies	Responsible	Timeline	Resources	Indicators
4.5.1 Making use of programs such as the OLPC, the $35 tablet computer from India and other low cost but high quality ICT equipment at a ratio of one student to one computer over a five year period.	Secretary NDOE & SDEs	September 2010 – August 2015	Human & financial resources	Per cent of ICT equipment using Open Source or reduced cost equipment
4.5.2 Build purchasing around use of open source software such as OpenOffice www.openoffice.org sponsored by the Oracle Corporation.	1) COM-FSM provide possible models 2) FACSSO revise and/or development & adopt & implement purchasing	1)September – October 2010 2) November 2010 – September 2011 and ongoing thereafter	Human & financial resources	Purchase plans identify use of Open source software or justify why to use propriety software

GOAL 5: PRODUCTIVITY

GOAL STATEMENT

The FSM education system at all levels will redesign processes and structures to take advantage of the power of technology to improve learning outcomes while making more efficient use of time, money, and staff.

RATIONALE

Continuous improvement is dependent on increasing the effectiveness and efficiency and productivity of systems, and individuals and groups within those systems. Using ICT to support improvement productivity addresses some but not all of the broad issues facing the FSM Education System. ICT can support improved communications structure and open up new avenues of communication; improve methods of data collection, analysis and reporting; increase access to critical information and evidence; provide mechanisms for monitoring and evaluation; and provide a basis for evidence based decision making. By itself, ICT will not change behaviors of individuals or group, but can help in provide a framework for evidence based discussions and decision making. ICT in conjunction with a willingness to change cultures of communication and work habits can result in increased productivity.

BENEFITS FOR LEARNING

Improved student, teacher, school, parent and community access to critical information and data (including progress against key performance indicators) provide the basis for evidence based decision making. Additionally, ICT can reduce the time and effort of teachers for learning planning, assessment and accessing instructional materials to allow greater focus on creating learning environments that lead to increased student learning and achievement.

In terms of administrator and principal learning, the adoption of the NETS standards for Administrators/Principals would provide a framework for monitoring, assessment and tracking process and continuous improvement.

REALITY IN THE FSM

ICT support for increased productivity is hampered as in other areas by a lack of sufficient Internet connectivity (bandwidth) at a reasonable cost, lack of and reliability of electricity, transportation costs and availability, and basic communication access to school sites. The lack of bandwidth, electricity, transportation costs prevent new technologies such as social networking, collaboration software and tools, cloud computing, shared (web accessible) databases, access to information and resource materials, access to research (EBSCO host through PREL), and other ICT technologies that are being used to increase productivity.

While there are some alternatives to Internet access through FSM Telecommunications Corp. such RICS, O3B, wave mail, PEACESAT, GE23 the reoccurring cost is often prohibited for adequate connectivity.

Regarding data collection and reporting, each SDOE and the national NDOE operate different data systems. The data systems run from PEDMS to MS Excel spreadsheets to MS Access databases. Data is suspect in terms of completeness and accuracy. Timeliness of data is also a problem. The NDOE has difficulty in preparing even the limited JEMCO 20 Education Indicator Report each year due to inaccurate and incomplete data submissions. There is limited reporting and limited evidence of the use of information and data for decision making at either the SDOEs or NDOE.

It was also noted that often individuals and departments are not using the appropriate software for the job at hand. ICT tools are the same as in other areas, understanding and use of the appropriate software tools will

greatly enhance the effectiveness and efficiency of job operations. It was also noted that few computers are using open source software such as Open Office that provides a office suite very similar in features to Microsoft office.

The JEMCO 20 Education Indicators themselves provide a very limited understanding of the FSM education system. Additionally, there is limited evidence that the JEMCO indicators are used for decision making in the FSM much less a broader range of key performance indicators needed to track progress of educational improvement in different areas of student learning and support services.

This trend is also seen in the lack of monitoring and evaluation systems that can ensure programs and services are being provided as designed and needed, and necessary information is available to make improvement in strategies to increase student learning and/or productivity.

The lack of information and data is also seen in the research area. Limited research is being conducted to assist in determining best education practices, trends in students and teacher learning and increases in productivity.

There is limited evidence that standards are in place to guide ICT usage for increasing productivity in the education system.

OBJECTIVE 5.1: DATA COLLECTION, ANALYSIS & REPORTING

Enhance data collection, analysis and reporting through use of appropriate software and ICT tools that tracks and reports enrollment and student achievement and other key performance indicators in a timely, accurate manner.

Strategies	Responsible	Timeline	Resources	Indicators
5.1.1 Improve and enhance a single national and state system for data collection, analysis and storage of electronic information through:	FACSSO & ICT specialists	September 2010 – March 2011 design	Human and financial resources	Evidence of a workable national data system
5.1.1.1 Design of national standardized web based data entry system for student demographics, enrollment, student achievement data, student and teacher attendance & other areas that operates within the bandwidth restrictions of the FSM	FACSSO & ICT specialists	1) September 2010 – March 2011 design 2) April 2011 (or earlier) – September 2011	Human and financial resources	Evidence of workable national data entry systems
5.1.1.2 Provide ongoing training for key national and state staff in use of web based data entry systems and ongoing training for key national and state staff in analysis and presentation of education information and evidence in the FSM and comparison data with international sources	Assessment & ICT specialists	After completion of web data system	Human resources	Per cent of trainees using web based data entry systems in a timely and accurate manner
5.1.1.3 Ensure the data system is able to track and analyze Key Performance Indicators as described in 5.4.1 including but not limited to the JEMCO 20 Education Indicators	FACSSO, assessment & ICT specialists	1) September 2010 – March 2011 design 2) April 2011 (or earlier) – September 2011	Human and financial resources	Evidence that data systems track critical education indictors including 20 JEMCO Indicators

5.1.1.4 Provide incentives and consequences for timely and accurate data entry of required educational data	Secretary NDOE & SDEs	After completion of web data system	Human and financial resources	Evidence of a system of rewards and consequences for data system use
5.1.2 Upgrade knowledge and skills for selection and use of appropriate software (database for data purposes, spreadsheets for calculations and graphing, word processing, presentation software, statistical review in databases, spreadsheets and in standalone statistical systems.	FSM Technology in Education Advisory Board	Ongoing	Human resources	Per cent of teachers and staff using appropriate software for a given task
5.1.3 Open source software should be considered and used whenever feasible and appropriate to the situation.	FSM Technology in Education Advisory Board	Ongoing	Human resources	Per cent of Open source software used in the education system

OBJECTIVE 5.2: KEY PERFORMANCE INDICATORS

Develop, track and report key performance indicators for ICT

Strategies	Responsible	Timeline	Resources	Indicators
5.2.1 Set, track and report key performance indicators based on the indicators listed under the Implementing section of this plan	FACSSO	September 2010 – February 2011	Human resources	Establishment of key education indicators in addition to the 20 JEMCO Indicators
5.2.2 Provided ongoing training to all education staff on interpretation, analysis and use of key performance indicators for decision making				Per cent of teachers and staff using key performance indicators in decision making

OBJECTIVE 5.3: RESEARCH & DEVELOPMENT CADRE (R & D)

Reestablish a research and development cadre composed of state, national and COM-FSM staff to address critical research and reporting of information necessary for increasing student learning and productivity of staff

Strategies	Responsible	Timeline	Resources	Indicators
5.3.1 NDOE/COM-FSM to coordinate establishment of R & D cadre for the FSM	FACSSO	September – December 2010	Human resources	R & D cadre established
5.3.2 Conduct survey to determine priority needs for research	R & D cadre	November 2010 – February 2011	Human resources	R & D cadre conduct initial research survey
5.3.3 Conduct training for design,	R & D training	November	Human &	Per cent of

implementation and reporting of research findings with implications for decision making		2010 – March 2011	financial resources	participants using training to improvement decision making
5.3.4 The R & D cadre will also function as a FSM Technology in Education Advisory Board to monitor new technologies, assessment tools and strategies and approaches to technology implementation that fit the FSM Education System	FSM Technology in Education Advisory Board (R & D cadre)	Ongoing	Human resources	Number of type of recommendations for ICT purchase

OBJECTIVE 5.4: BUDGETING FOR ICT

Develop a realistic budgeting plan for ICT

Strategies	Responsible	Timeline	Resources	Indicators
5.4.1 Develop a realistic strategy for budgeting for ICT including Internet access that addresses the a) fundamental changes in ICT's impact on education and learning b) use of the Internet for lesson planning, resource materials, assessment strategies, potential textbook replacement c) communication tool for students, teachers, parents, community and other stakeholders	1) COM-FSM provide possible models 2) FACSSO review & revise adopt	1) September – November 2010 2) November 2011 – March 2011	Human resources	Per cent change in ICT budgets
5.4.2 Coordinate seeking of funding for ICT and Energy projects from foundations and other international assistance available through the FSM National Government.	FACSSO	Ongoing	Human resources	Dollar value and impact of donor projects on ICT implementation

OBJECTIVE 5.5: ADOPTION OF NETS STANDARDS FOR ADMINISTRATORS/PRINCIPALS

Adopt the NETS Standards for Administrators/Principals as a guide to improving productivity

Strategies	Responsible	Timeline	Resources	Indicators
5.5.1 Adopt the ICTSE Standards for Administrators/Principals to set a framework for how ICT can support increased productivity at all levels of the education system	FACSSO	Adoption of FSM Tech Plan	Human Resources	FACSSO adoption of ICTSE standards for administrators & principals
5.5.2 Set and track key performance indicators for impact of ICT on productivity	1) COM-FSM propose potential indicators 2) FACSSO adopt and monitor	1) September 2010 – November 2010 2) November 2010 – February	Human resources	Change in key performance indicators for productivity

		2011		

OBJECTIVE 5.6: MONITORING AND EVALUATION (M & E)

Adopt a central monitoring and evaluation system that ensures tracking of program activities are occurring in a timely manner and being evaluated to ensure quality of programs and services.

Strategies	Responsible	Timeline	Resources	Indicators
5.6.1 Adopt a M & E system for the FSM as describe in appendix I	FACSSO	Adoption of FSM Tech Plan	Human resources	FACSSO adoption of M&E system
5.6.2 Periodically report on M & E based on key performance indicators.	NDOE & SDOE	Ongoing	Human resources	Number and quality of M & E reports on key performance indicators

APPENDIX

APPENDIX A: GLOSSARY

Glossary of ICT terminology[17]

This Glossary of ICT terminology contains a list of technical terminology and terms specific to ICT and language learning and teaching. This Glossary is provided to provide a direct source for understanding ICT terminology that may be encountered during the implementation process of this plan.

A

Acceptable Use Policy (AUP): An AUP is a set of rules that define the ways in which ICT facilities can and cannot be used in a business or educational institution, including a description of the possible sanctions that can be applied if a user breaks the rules. Two of the most important topics covered by an AUP are (i) e-safety and (ii) awareness of and compliance with copyright.

Access: The name of a Database program forming part of the Microsoft Office suite of programs.

Accessibility: The fundamental issue regarding accessibility is that everyone should have access to the services provided by ICT, e.g. computer programs, Email and the World Wide Web, regardless of any visual, auditory, or other physical impairment they might have. Assistive Technology may be employed to increase access to such services, e.g. Text To Speech (TTS) screen readers, screen magnifiers, speech recognition systems, hearing assistance devices, etc. Designers of computer programs and websites need to take account of accessibility when choosing colors, fonts and font sizes, etc: see Font.

Active Matrix: A term used to describe the newer type of computer Display Screen that makes use of Thin Film Transistor (TFT) technology: see TFT. Active matrix screens have excellent color resolution and can display motion accurately and rapidly. See Resolution.

Address Book: Usually supplied as part of your Email software. An address book in this sense is used to keep a record of all the email addresses of people whom you may wish to contact by email.

ADSL: Abbreviation for Asymmetric Digital Subscriber Line. A high-speed digital telephone connection that operates over an existing copper telephone line, allowing the same line to be used for voice calls. ADSL lines offer transmission speeds of at least 512Kbps, but nowadays usually in the range 1 Mbps to 8 Mbps, and are used mainly for Internet access. The term asymmetric is used because the data flows more quickly from the telephone exchange to the user than from the user to the exchange - because most Web users are more interested in receiving data quickly from websites rather than uploading it to websites. The term symmetric is used for

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[17] The principal author of this Glossary is Graham Davies, Thames Valley University. Entries for a number of technical terms were provided by Fred Riley, University of Nottingham.

connections where the data flows at the same speed in both directions, which is essential for accessing websites where there is a high degree of interactivity. See Broadband, ISDN, Kbps, Leased Line, Mbps.

Adware is software that may have been installed on your computer by a remote computer, i.e. via the Web. Many free utilities that you download from the Internet will install hidden software that sends details of the websites you visit and other information from your computer (which can include your email address) to advertisers so they can target you with popup ads and spam. See http://www.camsoftpartners.co.uk/bugs.htm, where tools for removing adware and spyware are described. See Spam, Spyware.

AJAX: Acronym for Asynchronous JavaScript and XML. AJAX is a Web programming tool (or rather a set of tools) that makes it possible to create interactive Web applications that work in much the same way as desktop applications, i.e. more responsive, more spontaneous, so that when you click on something on the Web page there is very little time delay - as in your desktop word-processor, for example. While you are browsing a Web page AJAX is working behind the scenes. AJAX allows your browser to fetch data from the Web and use it to update a fragment of the page without refreshing the whole page so that you don't have to wait for the whole Web page to refresh or reload each time you click on a button or initiate an action in some other way. This increases the Web page's interactivity, speed, functionality, and usability. Google Maps is a typical example of a Web application incorporating AJAX. Scroll around the map and watch it update itself with relatively little time delay: http://maps.google.co.uk/maps. AJAX is a programming tool that is used extensively in what are known as Web 2.0 applications.

Alt Key: The Alt keys can be found on either side of the space bar on a computer keyboard. They are commonly used in conjunction with a set of numbers to enable foreign characters to be typed. See ASCII, ANSI.

Analogue: The basic meaning of analogue is "something that corresponds to something else". For example, in the context of equipment used for recording and playing back sound, analogue refers to the way in which the sound is recorded and reproduced. If you look closely at the groove of a 33 rpm vinyl gramophone record you will see that it is essentially a continuous wave, an undulating series of "hills". These "hills" correspond to the nature and volume of the sound that has been recorded. As the stylus of the record player moves along the wave it produces vibrations that are amplified and converted into sound. A parallel can be drawn with radio transmissions, where the sound signals are transmitted in the form of invisible waves. Early mobile phones worked in a similar way. Older tape recorders and videocassette recorders are based on the same principle, except that the signals representing the sound and moving images are imprinted onto a plastic tape coated with a magnetic powder. All analogue recordings suffer from background noise, and the quality of reproduction gradually degrades as the record or tape wears out. If the recording is copied, the copy will not be as good as the original, regardless of the quality of the equipment used to copy it. See the contrasting term Digital.

Anchor: A term used in connection with HTML, the coding system used for creating Web pages. An anchor is the target of a Hyperlink, i.e. a point in a Web document to which you jump when you click on a hyperlink.
Animation: The display of a sequence of images in a computer program or on a Web page to give the impression of movement.

ANSI: Abbreviation for American National Standards Institute. This is a system that specifies code numbers for all the characters that appear on a computer Keyboard, plus the extended character set used in Microsoft Windows. It includes all the ASCII codes plus many others. Each character on the keyboard of a computer is assigned a unique ANSI code number, e.g. A = ANSI 065. Characters that don't appear on the keyboard can be typed by holding down the Alt key, pressing a series of digits on the number pad, e.g.
ALT + 0233, and then releasing the Alt key. 0233 is the ANSI code for é. See also Unicode. See Alt Key.

Anonymous FTP: An anonymous FTP is a convention whereby users are not required to identify themselves with an account number, user name or password when they access a website from which they wish to download publicly available programs or files. Users may, however, be required to enter their email address before accessing certain

websites. The vast majority of publicly available Freeware and Shareware archives on the Web permit anonymous FTP. See FTP.

Anti-virus Software: See Virus.

Apache: The most popular Web Server software on the World Wide Web. Apache runs mainly on Unix systems, although there is also a Microsoft Windows version. The
Apache Project website is at http://www.apache.org

Applet: A small program written in the Java programming language and embedded in a Web page. When you use your Browser to access a Web page, an applet may run "inside" the Web page, as it were, to perform an interactive animation, make a calculation or carry out another simple task.

Application: A computer program or a suite of computer programs that performs a particular function for the user, such as a word-processor, e.g. Microsoft Word, or a range of functions, such as Microsoft Windows or Microsoft Office. See Computer Program, Operating System, Windows, Word-processor.

Archive: Used to describe documents or files that are not immediately needed but which should not be completely discarded. An archive may be stored on a separate Hard Disk, CD-ROM, DVD or other Storage Device. Also used to describe stored messages that have been contributed to discussion lists or blogs. Also used as a verb. See Blog, Discussion List.

ASCII: Abbreviation for American Standard Code for Information Interchange. This is a system that specifies code numbers for all the characters that appear on a computer Keyboard, plus other specialized characters. Each character on the keyboard of a computer is assigned a unique ASCII code number, e.g. A = ASCII 65. Characters that don't appear on the keyboard can be typed by holding down the Alt key, pressing a series of digits on the number pad, e.g. ALT + 130, and then releasing the Alt key. 130 is the ASCII code for é. The ANSI character set (as used in Microsoft Windows) includes many more characters, Unicode includes even more and is becoming a standard coding system. See Unicode. See Alt Key.

Assistive Technology: This term describes computer software or devices used by people with special needs to enable them to access the services provided by ICT, e.g. computer programs, Email and the World Wide Web. Technologies under this heading include Text To Speech (TTS) screen readers for the unsighted or partially sighted, alternative keyboards and mice for people who have problems in hand-eye coordination, head-pointing devices, speech recognition software, and screen magnification software. See Accessibility, Pointing Device, SENDA.

Asynchronous: "Not at the same time". Often used to refer to communication by Email or via a Discussion List, where the recipients of the email or the participants in the discussion do not have to be present at the same time and can respond at their own convenience. A feature of asynchronous learning is that the teachers and learners do not have to be present at their computers at the same time. See Synchronous.

Attachment: A term used in connection with Email. An attachment can be a File of almost any kind - a document file, an image file, a sound file or a video clip - that you can add, i.e. attach, to an email.

Attribute: A term used by Web authors. An attribute of an HTML tag controls how that tag operates. For example, in the HTML fragment <img src="../images/home01.gif" alt="English home page">, the required attribute src defines the image file to be displayed, and the optional attribute alt defines the text to be displayed when the Mouse moves over the image. Attributes can only exist within tags. See HTML, Tag.

Audio Card: See Sound Card.

Audioconferencing or Audio Conferencing: A computer-based communications system

that allows a group of computer users at different locations to conduct a "virtual conference" in which the participants can hear one another as if they were in the same room participating in a real conference. Unlike Videoconferencing, audio conferencing systems do not allow the participants to see one another. See Conferencing.

AVI: Abbreviation for Audio Video Interleave (or Interleaved). A file format for storing video recordings on a computer. See ASF, MOV, MPEG, RM, which are alternative video file formats. See Media Player.

B

Backup or Back Up: Used as a verb, to back up means to copy a File or Folder from your computer to another Storage Device, e.g. a CD-ROM, as a precaution in case your Hard Drive fails or is infected by a Virus. A backup, used as a noun, or a backup copy describes a copy that you have made in this way. It is essential to back up new files and folders at regular intervals.

Bandwidth: The amount of data that can be sent from one computer to another through a particular connection in a certain amount of time, e.g. via a computer to the Internet and vice versa. The more bandwidth available, the faster you are able to access information.
Bandwidth is usually measured in kilobits per second (Kbps) or megabits per second (Mbps). See ADSL, Broadband, Kilobit, Megabit, Narrowband.

Baud: A unit of measurement at which data can be transferred (i.e. the baud rate), for example over a telephone line via a Modem or from a computer to an external device such as a Printer. Rarely used nowadays, as transfer rates are normally expressed in kilobits per second (Kbbs) or megabits per second (Mbps).

Binary: A number system using base 2 instead of the usual (human) base 10, which is normally referred to as the decimal system. Computers use base 2 because they can only recognize two values, 1 or 0. This is simulated electronically by using a device, such as a switch, which is either on (1) or off (0). All numbers are represented by combinations of ones and zeroes, thus the number 9 is represented as 1001, the right-most column being the units column and the other columns, moving from right to left, being 2, 4, 8. See Hexadecimal.

Binary File: Strictly speaking all computer files are Binary, consisting of a string of ones and zeroes, but the term binary file is often used to differentiate program files and data files from text files, which contain only unformatted printable ASCII characters. See ASCII, Text File.

BIOS: Acronym for Basic Input/Output System. This is a built-in ROM Chip on the Motherboard containing essential programs to manage the computer's input and output, which are loaded into memory during the boot process. See Boot, ROM.

Bit: Contraction of binary digit. A bit is the smallest measurement unit of computer memory or data transmission speed, e.g. via a Modem. See the entry on Measurement Units. See Byte, Kilobit, Kilobyte, Megabit, Megabyte.

Bitmap: A computer graphic or image composed of thousands of individual dots or pixels, each pixel being stored as a number. The image is displayed by specifying the colour of each pixel. Bit-mapped graphics can be imported into other applications, e.g. a word-processor, but they cannot be edited within these applications. When bit-mapped graphics are resized they usually suffer a loss of sharpness, whereas vector graphics can be resized without such loss. See BMP, Pixel, Resolution, Vector Graphic.

Blackboard: A commercial Virtual Learning Environment (VLE) package, i.e. a software package that integrates online communications software with content software enabling teachers to create courses that are delivered partially or entirely via the Web. Courses using Blackboard might be mainly text-based, but can be enhanced with images, audio and video. See: http://www.blackboard.com. Blackboard and WebCT announced an agreement to merge in October 2005.

Blended Learning: This term normally refers to combining Internet-based distance learning with face-to-face tuition but it may also be used to describe combining offline ICT-based materials with more traditional materials, such as books, audiocassettes and videocassettes. See Distance Learning, E-learning, Online Learning, Virtual Learning Environment (VLE).

Blog: Contraction of the term Weblog. A blog is essentially a website that contains discrete pieces of information posted by different users. New items of information are usually entered by contributors via a simple form, following the introduction of each new theme by a person who initiates the blog, and then submitted to the site, where they may be filtered by an administrator before being posted. A blog can contain news items, short essays, annotated links, documents, graphics, and multimedia. These posts are usually in reverse chronological order and often take the form of a journal or diary. A blog is normally accessible to any Internet user, but closed blogs may also be created, e.g. to document the thoughts and experiences of a group of students or to provide a means of communication between teachers and students following a particular course. The word blog is also used as a verb and Blogger is used as a noun to describe someone who blogs (see next entry). A blog is usually distinguished from an Internet Discussion List (also known as a Forum), but the latter can function in a similar way insofar as it typically allows any user to post messages to it that can be viewed via the Web. See Moblog, RSS, Splog, Wiki.

Blogger: Normally used to refer to someone who blogs, i.e. who regularly writes blogs. Also used to describe a service that provides Web-based tools used by individuals to create a Blog or Weblog. See http://www.blogger.com
Bluetooth: Bluetooth is a technical industry standard for radio technology which facilitates the transmission of signals over short distances (up to around 10 metres) between telephones, computers and other devices without the use of wires. For example, a Bluetooth-enabled mobile phone can communicate with a desktop computer for the purpose of synchronizing data, such as an appointments diary.

Bookmark: A bookmark is a facility within a Browser that enables you to keep a record of Web pages that you have visited and may wish to visit again. Bookmarks are stored in a subdirectory of the Windows directory on your computer. In Internet Explorer bookmarks are known as Favorites (sic - spelt the American way), which is also the name of the subdirectory in which they are stored. Bookmarks are also used to mark positions in a Word document, i.e. positions to which you can jump from other points in the document by clicking on them with the Mouse.

Boot: (verb) To start up a computer by loading the operating system into memory. The computer is regarded as bootstrapping itself into operation, i.e. picking itself up by its own bootstraps. The adjective bootable is often used to describe a backup disk that can be used to start a computer, e.g. when the hard disk fails or becomes corrupted for some reason. See Operating System.

Bot: Short for Robot. See Crawler.
bps: Abbreviation for bits per second, the smallest measurement of data transmission speed, e.g. via a Modem. Computer people normally measure data transmission speeds in Kbps, meaning kilobits per second, or Mbps, meaning megabits per second. If you have a 56Kbps modem (which is slow by today's standards) it means that your modem can transmit at speeds up to 56,000 bits of information per second. See Bit, Kilobit, Megabit.

Broadband: A general term used to describe a high-speed connection to the Internet. Connection speed is usually measured in Kbps (kilobits per second) and Mbps (megabits per second). Typically, a home user will have a broadband connection using an ADSL telephone line running at 512Kbps to 8Mbps. Educational institutions ideally need a symmetric connection of at least 8Mbps to ensure smooth trouble-free connections to the Internet when large numbers of students are accessing the Internet all at once. See ADSL, Bandwidth, ISDN, Kilobit, Leased Line, Megabit. Contrasted with Narrowband.

Browser: A software package installed on the hard disk of your computer that enables you to access and to navigate the World Wide Web - to "surf the Web" in colloquial terms.

Buddy Learning: See Tandem Learning (Buddy Learning).

Bulletin Board: A type of forum on the Internet or an intranet, where users can post messages by email or via the World Wide Web for other users to read and respond to. Bulletin Board Systems (BBSs) have largely been replaced by other types of online systems for communal communication, such as blogs, discussion lists and forums. See BBS, Blog, Discussion List, Forum.

Bug: Not a nasty insect but a logical fault in a computer program which causes it to malfunction. All computer programs contain bugs, some of which take years to come to light. It is rumored that the term arose as a result of moths getting into the circuitry of an older Mainframe Computer, causing it to break down. See Debug, Millennium Bug.

Burn: When data is written to a CD, for example using a CD-Read/Write drive, a pattern of microscopic dots is etched with a laser beam in a spiralling track on the CD surface. This is a process often referred to as "burning a CD". See CD-ROM.

Bus: Not the sort you get on to go into town. This is basically a set of parallel wires for connecting the Central Processing Unit (CPU) of a computer to all other input-output devices. Data can be transmitted in two directions, from and to the CPU.

Byte: A measurement of computer memory or disk capacity. A byte comprises 8 bits. See entry on Measurement Units. See Bit, Gigabyte, Kilobyte, Megabyte,

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C

Cache: The cache contains information stored by a Web Browser on your hard disk, so that you don't have to download the same material repeatedly from a remote computer. Browsers keep copies of all the Web pages that you view so that the pages can be redisplayed quickly when you go back to them. The cache is normally stored under Windows in a folder called Temporary Internet Files. This folder can become enormous over time and can cause your hard disk to become overloaded and then your computer may lock up. The cache needs to be emptied at regular intervals - which you can do manually or using utility software such as Window Washer. You can set the maximum size of the Temporary Internet Files folder, using the Tools menu in your browser.

CAD/CAM: Abbreviations for Computer Aided Design / Computer Aided Manufacturing. A process of drafting, designing and manufacturing with the aid of a computer. CAD enables the user to manipulate drawings, including 3D drawings, and viewing them from a variety of angles. CAM is a general term for computer support during the manufacturing process.

CAI: Abbreviation for Computer Assisted Instruction.

CALL: Abbreviation for Computer Assisted Language Learning. A term which came into favour in the early 1980s, replacing the older term CALI (Computer Assisted Language Instruction). Often associated (wrongly) with an old-fashioned approach to the use of ICT in language learning and teaching, but the leading professional associations, i.e. EUROCALL, CALICO and IALLT, interpret CALL as meaning the use of computers in the learning and teaching of foreign languages in the broadest sense, from the use of word-processors to the use of the Internet. See CALI, CELL, TELL.

Camcorder: A portable video camera, capable of recording live motion video for later replay through a videocassette recorder (VCR), DVD player or computer. Videos produced by a camcorder can be uploaded to a computer via a USB cable or Firewire, edited using special software such as Movie Maker, and played on a computer using Media Player software.

Card: In computer jargon, a card is an electronic circuit board, usually one which can be slotted into your computer in order to fulfill a specialized function. See Sound Card, Video Card.

Case Sensitivity: Used to describe how a computer program, e.g. a Browser, interprets upper and lower case letters, e.g. in the name of a program, the name of a folder stored on your computer, or the name of a website. Some computer programs may be case sensitive, in other words they make a distinction between capital letters and lower case letters so that, for instance, Manchester is perceived as different from manchester. Other programs may not make a distinction and perceive capital letters and lower case letters as one and the same. Be especially careful when typing the names of websites, as case sensitivity may be crucial and you may not be able to find the website if you fail to type capital letters in the right places.

Cathode Ray Tube (CRT): An older type of computer Display Screen or Monitor, in which beams of high-voltage electrons are fired at a screen causing thousands of Red, Green and Blue (RGB) dots to glow in different combinations and intensities, thus producing the full-colour image displayed on the screen. Cathode Ray Tubes are also used in older domestic TV sets. Newer types of display screens are of the LCD or TFT flat panel type - like many modern TV sets. They are much lighter, use less electricity and take up less room on a desktop.

CD-ROM: Abbreviation for Compact Disk Read Only Memory. A CD-ROM is an Optical Disk on to which data has been written via a laser - a process often referred to as "burning a CD": see Burn. A CD-ROM looks much the same as an audio CD, but can contain text, sound, pictures and motion video. Once written, the data on a CD-ROM can be fixed and rendered unalterable, hence the term read-only - but modern computers are usually equipped with a read/write CD-ROM drive that enables new material to be stored on a special kind of CD-ROM: CD-R (recordable) or CD-RW (rewriteable). It is worthwhile investing in a read/write CD-ROM drive for making backups and storing your own multimedia materials. Blank CD-Rs or CD-RWs can be bought from computer media suppliers at a relatively low cost. You can store data on CD-Rs using a read/write drive, adding to it until it is full, and then you can format the CD-ROM so that it is fixed and can be read by a standard CD-ROM drive. You can also store data on CD-RWs in the same way, but these discs can only be read by a read/write CD-ROM drive. The advantage of CD-RWs is that they can be erased and used over and over again, but now that the cost of blank CD-Rs has fallen to such a low level it is questionable how useful CD-RWs are. See Combination Drive, Digital Video Disk (DVD).

Central Processing Unit (CPU): Also known as the Central Processor. In a modern computer the CPU is a single microprocessor Chip or Microchip, an integrated circuit which carries out information processing and calculations. In essence, the CPU is the computer's "brain". See Clock Speed, Microprocessor, Motherboard.

CGI Script: A term used by Web authors. CGI is an abbreviation for Common Gateway Interface. A program residing on a Web Server, usually in a directory called cgi-bin, which processes data from an HTML form. CGI scripts can be written in any programming language suitable for handling text data, but Perl (http://www.perl.com) is the most popular scripting language.

Chat Room: A synchronous, mainly text-based communication facility, offering a Web-based environment where people either drop into or arrange to meet and chat at specific times. You type in your text online, it is seen almost immediately by others online at the same time who respond online in real time. When used for language learning chat rooms can put a great deal of pressure on students by requiring them to read fairly rapidly and to write, also fairly rapidly, with little time to reflect on the quality of the language used. A degree of caution is advised when joining a chat room. Some have been used for sinister purposes.

Chip: Short for Microchip or Silicon Chip.

Client: A computer that receives services from another computer. A stand-alone computer on your desk which you use to browse the Web is a client, and the computers from which World Wide Web files are downloaded to your computer are servers. Similarly, a computer (also known as a workstation) connected to a Local Area Network (LAN) is a client that can receive information from and send information to the server that controls the LAN. See Browser, Server, Web Server.

Clipart or Clip Art: A collection of image files that can be embedded or inserted into Web pages, word-processed documents, PowerPoint presentations, etc. Some clipart images are copyright-free or in the public domain but others may be subject to a license fee if you wish to make them public, e.g. on a website. See Copyright.

Clipboard: A temporary storage area in a computer's memory. It may be used, for example, to store text that you are in the process of copying and pasting from one section of a word-processed document to another section in the same document or to another document. You should find a clipboard viewer program on your computer, which enables you to see what is currently being temporarily stored in the clipboard.

Clock Speed: The speed of a computer's Central Processing Unit (CPU), which is normally expressed in MegaHertz (= one million cycles per second) or GigaHertz, (= 1000 MegaHertz). This figure represents the number of instruction cycles the processor carries out each second. In simple terms this indicates how fast the computer runs - how powerful it is. Computers that run at 500 MegaHertz (500MHz) used to be considered fast, but modern computers now run at over one GigaHertz (1GHz). See Hertz, Microprocessor.

CMS: Abbreviation for Content Management System, a software package that makes it possible for non-technical users to publish content (text, images, etc) on a website. Also stands for Course Management System, a type of Virtual Learning Environment (VLE).

CODEC: Short for COmpressor / DECompressor or COder / DECoder. A CODEC is software that is used to compress or decompress a digital audio or video file. CODECs are additional pieces of software that operate in conjunction with different media players, and certain types of audio and video recordings will only play back if the relevant CODEC is running in conjunction with the media player that you are using. A CODEC can consists of two components, an encoder and a decoder. The encoder compresses the file during creation, and the decoder decompresses the file when it is played back. Some CODECs include both components, while other CODECs include only one. CODECs are used because a compressed file takes up less storage space on your computer or on the Web. When you play an audio or video file in your media player it will use a CODEC to decompress the file.
Collaborative Writing: A process that involves the creation and editing documents using Web 2.0 tools designed for use by multiple authors, e.g. Google Documents (see Google) or Zoho Writer: http://writer.zoho.com. Such tools look, act and feel like normal word processors, but simplify the process of sharing and viewing documents.
Combination Drive: A Disk Drive that is capable of reading and writing to CD-ROMs, audio CDs and DVDs.

Compatibility: Pieces of hardware and/or software which are capable of being used together are described as compatible.

Compiler: A program which converts programs written in a high-level programming language, i.e. as used by professional human programmers, into Machine Code, a language that can be "understood" by a computer. A compiler produces a binary executable program file after the programmer has completed the programming. Program files on personal computers can be recognized by their three-letter .exe or .com Extension after their filenames, e.g. winfile.exe. See Binary File, Executable, Interpreter, Programming Language.

Compression: A technique which reduces the amount of space required to store data, e.g. as used to reduce the amount of space needed to store an image, an audio recording, or a video recording.
Computer Assisted Instruction (CAI): A term used mainly in the business world. Implies a top-down, instructor-centered approach to teaching with computers and is closely associated with Programmed Learning. See CALI.

Computer Based Training (CBT): A term used mainly in the business world. Implies a top-down, trainer-centered approach to teaching with computers and is closely associated with Programmed Learning.

Computer Mediated Communication CMC): Computer Mediated Communication is used as a term describing the use of the Internet as a means of fostering teaching and learning, especially the use of Email, Conferencing and Social Networking. See the entry under Web 2.0.

Computer Program: A set of instructions that the computer carries out in sequence to perform a given task. Programs are written in English-like programming languages (e.g. C, Pascal), and are then converted into binary machine instructions via a compiler or an interpreter. See Compiler, Interpreter, Programming Language.

Concept Keyboard: An overlay or replacement for the traditional computer Keyboard. Concept keyboards are useful for small children or learners with special needs: for example, offering pictures or symbols as an alternative to the alphabetic keyboard.

Conferencing: Computer conferencing is a development of Email designed to support many-to-many communication, whereby computer users in different locations can take part in a "virtual conference". A conference usually consists of a group of participants who have a common interest in the conference subject matter. Computer conferencing software enables the organization, storage, structuring and retrieval of messages. Messages may be organized under different topics, by author or by date of posting. Asynchronous conferencing may take place via a Blog, Discussion List, Forum or Wiki: headed Discussion lists, blogs, wikis, social networking. Synchronous conferencing takes place in "real time", e.g. within a Chat Room. See also Audioconferencing, Videoconferencing.

Continuing Professional Development (CPD): Further study relevant to one's profession that most bodies encourage their members to undertake. This can take the form of seminars, research, training courses, etc. The materials at the ICT4LT website can serve the purposes of CPD.

Cookie: A piece of information stored on a user's computer by a Web Browser when the user visits a website for the first time. Websites use cookies to recognize users who have previously visited them. The next time that the user visits that site, the information in the cookie is sent back to the site so that the site can tailor what it presents to the user, e.g. tastes in music or shopping habits.

Copyright: New technologies have raised all kinds of new issues relating to copyright - mainly because it has become so easy to copy materials from a variety of digital sources. We have produced a Web page at the ICT4LT site: General guidelines on copyright.

Course Management System (CMS): A type of Virtual Learning Environment (VLE), e.g. Moodle.

Courseware: A set of computerized lessons, exercises, tests and reference material.

CPU: Abbreviation for Central Processing Unit.

Crash: A term describing what happens to hardware or software when it suddenly fails to work properly. The commonest symptom of a crash is the "frozen screen", i.e. when the keyboard and/or mouse goes dead with the result that nothing can be typed and the Cursor cannot be moved around the screen. Modern computers typically crash several times a day. Most crashes are not serious and are simply the result of faulty programming - i.e. most programming. Some kinds of crashes can be symptomatic of more serious problems, however, and should be investigated if they keep occurring. Operating systems themselves, e.g. Microsoft Windows, are particularly prone to crashes. See Operating System, Windows.

Crawler: A crawler is a program that searches the Web for new links, new content and changes in order to keep Search Engine results up to date. A crawler may also be called a bot (short for robot) or spider. Crawlers within search engines perform a useful indexing function, but there are also crawlers or bots that have more sinister motives, such as gathering addresses to be targeted by spammers. See Spam, Spambot, Spyware.

CRT: Abbreviation for Cathode Ray Tube.

Ctrl Key: The Ctrl keys can be found on either side of the space bar on a computer keyboard. They are used in conjunction with other keys as "shortcuts" for operations that would normally be carried out with a Mouse, e.g. Ctrl + S will save a file that you are working on. It is also possible to program the Ctrl keys to carry out operations that you specify yourself, e.g. for typing foreign characters.

CUI: Abbreviation for Character User Interface.
Cursor: The pointer which appears on screen and is controlled by a pointing device, such as a mouse. The cursor usually has the shape of an arrow, but can also take other shapes: e.g. an I-beam in a document, an hourglass whilst an operation is under way, or the graphic image of a hand over a Hyperlink. See I-Beam, Mouse, Pointing Device.

Cyberspace: William Gibson coined this phrase in his novel Neuromancer, first published in 1984 - some years before the World Wide Web was invented: "Cyberspace. A consensual hallucination experienced daily by billions of legitimate operators, in every nation, by children being taught mathematical concepts... A graphic representation of data abstracted from the banks of every computer in the human system. Unthinkable complexity. Lines of light ranged in the nonspace of the mind, clusters and constellations of data. Like city lights, receding..." Today the word cyberspace is used to refer to the world of the Internet, more specifically the World Wide Web. See Internet, World Wide Web.

Cyber squatter: A term normally used to describe someone who registers the name of a popular Web address - usually a company name - with the intent of selling it to its rightful owner at a high price. Cyber squatters also watch out for registered domain names that become available when the owner has no further use for them, goes bankrupt, or simply forgets to pay their registration renewal fees. This can lead to perfectly harmless and legitimate sites being transmogrified overnight into sites containing offensive material. See Graham Davies's article on "Dodgy links": http://www.camsoftpartners.co.uk/DodgyLinks.htm. See also Linkrot.

D

Data: Strictly speaking the plural of "datum", but now usually considered as a collective noun in the singular, with the plural form "data items" or "items of data". Data is information in a form which can be processed by a computer. It is usually distinguished from a computer program, which is a set of instructions that a computer carries out. Data can be text or sets of figures on which a computer program operates. See Computer Program.

Database: A structured collection of data that can be used for a variety of purposes. Databases are usually stored on a Hard Disk inside your computer, on a CD-ROM, or at a website. A database may contain data relating to staff employed by a company or to students at an educational institution. Databases can also contain bibliographies, glossaries, vocab lists, etc. In order to set up and manage a database you need a database program such as Microsoft Access.

Data Driven Learning (DDL): An approach to language learning pioneered by Tim Johns, University of Birmingham, whereby learners of a foreign language gain insights into the language that they are learning by using concordance programs to locate authentic examples of language in use. In DDL the learning process is no longer based solely on the teacher's initiative, his/her choice of topics and materials and the explicit teaching of rules, but on the learner's own discovery of rules, principles and patterns of usage in the foreign language. In other words, learning is driven by authentic language data. See Concordance Program.

DBMS: Abbreviation for Database Management System. An Application enabling the storage, modification, retrieval, and querying of data in a Database.

DDL: Abbreviation for Data Driven Learning.
Debug: To test a program and remove all the bugs. Permanent bugs that defy eradication are often referred to ironically as "features". See Bug.

Default: A setting or value automatically assigned to a computer program or device in the absence of a choice made by the user. When you use a program for the first time, e.g. a Browser or Word-processor, all the settings will have been preset to their default values - many of which can be changed to settings that you prefer, e.g. the default font type and size. The term default route is used in connection with Computer Assisted Language Learning, meaning the route that the teacher believes to be optimal for the learner to follow in a computer program or suite of programs - but which can be overridden by the learner if s/he wishes to follow his/her own route: see

Defrag: Short for defragment. A process run by a defragging program (usually supplied as part of Microsoft Windows) whereby parts of data files scattered around different segments of a computer hard disk are gathered together into continuous file segments. This makes applications run more efficiently and also frees up disk space.

Desktop: The main workspace in Windows, an electronic desktop which is displayed as the opening screen when Windows is started. The electronic desktop is a metaphor for the top of a real desktop, where jobs to be done are laid out in different folders, symbolised by icons, i.e. small images. Users open and work with programs by clicking on icons on the desktop, and they can also store shortcuts to documents or websites there. See Icon.

Desktop Computer: A desktop computer is one that is designed to sit permanently on a desk, as opposed to portable computers, e.g. Laptop Computer Notebook Computer and Netbook, all of which can easily be carried around.

Desktop Publishing (DTP): An Application for laying out text, graphics and pictures in order to produce a professional-looking publication. Most modern word-processors can now achieve what older DTP packages were capable of producing. Examples of DTP applications are QuarkXpress and PageMaker, which have probably become too complex and technical for the inexperienced user and are now aimed at the professional graphic designer or layout artist. See Word-processor.

Device Driver: Software that enables a computer to communicate with a hardware device such as a Mouse, Printer or Scanner. Hardware devices must each have the proper device driver installed in order to enable them to run. Most hardware devices are supplied with small programs that are installed onto your hard drive when you use them for the first time and tell the computer how to communicate with that specific device.

Dial-up Modem: An older type of Modem that connects a computer to the Internet via a standard telephone line. Typically a dial-up modem connects to the Internet at a very slow data transmission speed of only 56 Kbps, whereas a modern Broadband modem connects to the Internet at 512 Kbps or much higher. Because dial-up access uses normal telephone lines, the quality of the connection is often poor. See Kbps.

Digital: The essential meaning of this term is "based on numbers". The modern computer is a typical example of digital technology, so are CD-ROMs, DVD-ROMs, audio CDs and video DVDs, on which numbers are coded as a string of tiny pits pressed into a plastic disc. When a CD audio recording or a DVD video recording is played back, using equipment incorporating a laser as a reading device, the exact numeric values are retrieved and converted into sound or images. Digital recording is relatively free from noise and interference and gives a very high quality of reproduction. Data (including audio and video) or programs stored on CD-ROM or DVD can be read by a computer in a similar way. There are two major benefits to digital technology. Firstly, digital technology - because it is based on numbers - is more precise. Secondly, digital technology is becoming cheaper and more powerful. Digital technology is now used in radio and TV broadcasts. Digital recordings made from any source (audio- or videocassettes, television, radio, Internet, satellite TV, microphone or Camcorder) can be edited easily, then stored on a computer's Hard Disk, CD-ROM, DVD, Flash Drive, Memory Stick, etc. They can be copied without quality loss and, more significantly, can be used by more than one learner at the same time. See the contrasting term Analogue.

Digital Camera: A camera used for taking still photographs - but some digital cameras can also record short sequences of moving images. A digital camera looks much the same as an ordinary camera but stores photographs

in electronic format so that they can be uploaded computer via a USB cable to a computer. The more expensive digital cameras achieve better results than can be achieved by using an ordinary camera and a scanner. See Camcorder, Scanner, Upload.

Digital Video Disk or Digital Versatile Disk (DVD): A Digital Video Disk or Digital Versatile Disk is an Optical Disk that is capable of storing high-quality video as well as other forms of data, e.g. programs, text, still pictures and graphics. It is possible that DVDs will completely replace CD-ROMs in the not-too-distant future. DVDs can only be read or written to on multimedia computers equipped with a DVD drive or Combination Drive. See CD-ROM, See Section 1.2.5, Module 1.2 for more information on DVDs and DVD drives.

Digitize / Digitize: To translate into a digital form, i.e. numbers. For example, scanners digitize images by translating them into bitmaps, i.e. thousands of individual dots or pixels. It is also possible to digitize sound and video by Sampling at discrete intervals. To digitize sound, for example, a device measures a sound wave's characteristics many times per second and converts them into numeric values which can then be recorded. See Analogue, Bitmap, Digital. Pixel.

Directory: A location on a disk containing a group of files and subdirectories grouped together for organizational purposes . The term is used synonymously with Folder, which has become a more common term since the introduction of Windows. Subdirectories are sometimes referred to as "child directories" of the "parent directory". The topmost directory on a computer, which is the parent of all directories on the disk, is known as the root directory and usually has the pathname C:\. See File, Pathname, Root Directory.

Disk or Disc: Usually spelt "disk" - an abbreviation of diskette. A disk may take several different forms and is used for the permanent or temporary storage of data that can be read by a computer. See CD-ROM, DVD, Floppy Disk, Hard Disk, Storage Device.

Disk Drive: A device within or connected to a computer that enables data to be read from and written onto a disk. See CD-ROM, Disk, DVD, Floppy Disk, Hard Disk.

Display Screen: The screen on which output from a computer is displayed. Also referred to as a Monitor. Older computers used a Cathode Ray Tube, which is essentially the same as that used in older domestic TV sets. Newer types of display screens are of the LCD or TFT flat panel type - like many modern TV sets. They are much lighter, use less electricity and take up less room on a desktop.

Disruptive Technology / Disruptive Innovation: Terms that appear in Christensen C. (1997) The innovator's dilemma, Cambridge, Massachusetts: Harvard Business School Press and Christensen C. & Raynor M. (2003) The innovator's solution, Cambridge, Massachusetts: Harvard Business School Press. "A disruptive technology is a new technological innovation, product, or service that eventually overturns the existing dominant technology in the market, despite the fact that the disruptive technology is both radically different from the leading technology and that it often initially performs worse than the leading technology according to existing measures of performance." See http://en.wikipedia.org/wiki/Disruptive_technology

Distance Learning: A form of learning that takes place where the teachers and the students are in physically separate locations. Distance learning can be either Asynchronous or Synchronous. Traditional distance learning includes the mailing of printed materials, correspondence between teachers and students in writing, contact by telephone, and radio and television broadcasts. More recently, distance learning has included E-learning and/or Online Learning. The British Open University (OU) is one of the oldest established distance-learning establishments to have embraced existing technologies, i.e. radio and television, when it was set up in the 1960s. The OU continues to embrace new distance learning technologies as they become more widely available: http://www.open.ac.uk/new/distance-learning.shtml. See Blended Learning, Virtual Learning Environment (VLE).

DNS: Abbreviation for Domain Name Server.

DOC: The standard three-letter Extension to a document file produced by Microsoft Word.

Domain Name: A unique name that identifies a Website. A domain name can be purchased from and registered by a domain name registration company, e.g. our name ict4lt.org was purchased from Amenworld: http://www.amenworld.com. Such companies also provide a service that will check if a required name is available for purchase. Domain names always have two or more parts, separated by dots. The part on the left side is specific and the one one the right is more general. Our website's domain name is divided into two parts, ict4lt and org, the former part being our project name and the latter indicating what kind of body we are: org = "organization". Our domain name is therefore ict4lt.org. Universities' domain names in the UK always end in ac.uk = "academic UK". UK-based companies can often be identified by co.uk.
.
Domain Name Server (DNS): See Domain Name, Name Server.

Dot Matrix Printer: An older type of printer that works by firing sets of pins in different combinations at an ink ribbon located against a sheet of paper. Such printers produce text that looks "ragged". Laser printers and ink-jet printers are now much more common.. See Printer.

Download: To transfer a copy of data, a computer program, a text file, an image file, a sound file or video file from one computer to another computer. This is the main means of obtaining data and programs from the World Wide Web. See Upload, World Wide Web.

dpi: Abbreviation for Dots Per Inch. A measure of the of the quality of output, i.e. the number of dots per square inch produced by a printer or scanner, also referred to as its resolution. A resolution of at least 300 dpi is considered reasonable for the production of high-quality output by a printer and 1200 dpi by a scanner, but modern printers and scanners can produce many more dots per square inch. The resolution of a scanner may also be expressed by two numbers. These are mostly the same, e.g. 1200 x 1200, but you may also see 1200 x 2400, which means that the number of horizontal dots is different from the number of vertical dots. See Printer, Resolution, Scanner.

E

E-learning: E-learning (electronic learning) has become a buzzword in recent years, but it is widely misunderstood and often associated with a limited view of e-learning. Ask a dozen people what they understand by e-learning and most will probably say that it involves using a computer to access materials on the Web or to follow a distance-learning course using a Virtual Learning Environment (VLE). Here is the definition given in the UK government's consultation document Towards a unified e-learning strategy, July 2003:

Electronic Mail: See Email.
Electronic Whiteboard: More commonly referred to as an Interactive Whiteboard these days.

Email: Contraction of Electronic Mail. A system for creating, sending and receiving messages via the Internet. In order to send and receive email messages you have to register with an Internet Service Provider (ISP) that provides an email service and have email software such as Outlook or Eudora installed on your computer. Many ISPs also offer a Webmail facility, which provides an alternative means of creating, sending and receiving email messages using your Web Browser.

Encryption: A system of coding that helps prevent access to private information on computer networks or on the Web.

End-user: The final user of a piece of Software or Hardware, i.e. the individual person for whom the product is created, as distinct from the people who create and produce the product.

Excel: The name of a Spreadsheet program forming part of the Microsoft Office suite of programs.

Executable: This describes a program which has been converted (compiled) into binary machine code. If you double-click on an executable program name in Windows Explorer, it will immediately execute itself - i.e. run. Executables usually have the Extension .exe or .com. See Compiler, Machine Code.

Expansion Slot: A long, multi-pin socket on the computer's Motherboard into which an add-on card (such as a Sound Card) can be inserted to enhance the computer's capabilities.

Extension: In computer jargon an extension is an optional addition, usually consisting of a dot plus three or four letters, to the name of a File. The extension to the filename helps the computer (and the user) recognize what type of file it is and what it may contain, e.g. .doc is a Word document file, .exe is a computer program, .jpg or .jpeg is a picture file, and .htm or .html is a Web page file. See the following websites for further information on file extensions, what they mean, and links to sites offering utilities for managing and converting different types of files:
Dot What!? http://www.dotwhat.net
File Extensions: http://www.file-extensions.org
Fileinfo: http://www.fileinfo.com

F

FAQ: Abbreviation for Frequently Asked Question. The ICT4LT project's list of FAQs is located here.

File: A file in computer jargon can be used to describe many different things. It may be a Computer Program, a document file created with a Word-processor, an image file, an audio file, a video file, etc. Think of it in the same way as you would think of a file in a filing cabinet. A file has a name that describes what it is, and the file is stored in a place where you can easily find it. Files are usually grouped together on a computer's Hard Disk in directories or folders and, as well as their names, they usually have a three-letter Extension that tell you what their function is or what they contain, e.g. fwtt.exe is a program, mystory.doc is a Word document, sally.jpg is a picture, and mydog.mpg is a video file. Files may also be stored on CD-ROMs, DVDs and Flash Drives. See Directory, Extension, Folder, .

Filename: The name of a File on a computer.
File Permissions: Files stored on a computer usually have permissions governing which users are allowed to read, amend or execute them. This is particularly important in a school, college or university network environment, where teachers and lecturers may have the permission to amend certain files, e.g. documents that they have created, but students are only allowed to read them. File permissions are usually determined by network managers.

File Transfer Protocol: See FTP.

Firewall: A firewall is a software package that sits between your computer and your Internet connection, keeping an eye on the traffic going to and fro. If anything suspicious appears, such as an unauthorized attempt from a remote computer to write information to your hard disk or to send information from your computer to a remote computer, it will block it and warn you. Firewalls have become essential these days because of the frequent attempts being made by hackers to grab confidential information from computers all around the world, e.g. your bank or credit card details, which may be stored in a file somewhere on your computer. Any computer is vulnerable while it is connected to the Internet. The author of this paragraph writes from personal experience: two attempts have been made by hackers to grab passwords from his computer. Both attempts were fortunately spotted by his Internet Service Provider and blocked, so no damage was done. If you access the Internet via a computer in a public or commercial organization your ICT services department has almost certainly installed a firewall, but if you access the Internet via your personal computer then you should make sure that you install your own firewall. In addition you should install an anti-virus package. See Hacker, Virus.

Firewire: A firewire is in essence a facility that allows you to transfer video recordings very quickly from one device to another, e.g. from a Camcorder to a computer, using a special cable that connects to the computer's fireware socket. Many modern computers already have a firewire socket built in. If your computer does not have a firewire socket then you have to buy a firewire card and slot it in.

Firmware: Software that has been written to a ROM (Read Only Memory) chip by the manufacturers. See ROM, Silicon Chip.

Flash Drive: A portable Storage Device. Flash drives look like a small flat pen, around 5cm to 10cm long, and are easily carried in your pocket. Their storage capacity is impressive; 2GB is not unusual these days. They are used to store data that you wish to carry around, e.g. a PowerPoint presentation, and they can be plugged into any computer with a USB socket. Flash drives are also commonly referred to as pen drives or memory sticks.

Flash Player and Flash Professional: Software produced by Adobe for the development and viewing of animated and interactive sequences on the Web. See Plug-in.

Folder: An alternative word for a directory and which has become more common since the introduction of Windows. It describes a location on a disk which contains a set of related files. A folder can be divided into sub-folders. See Directory, Pathname.

Font: The terms font (also spelt fount) and typeface are often confused or interchanged. Font refers to a complete collection of letters, numerals, symbols and punctuation marks that have common characteristics, including their style and size. The two commonest fonts are Times New Roman, a Serif font, which is characterized by cross-lines that finish off the stroke of each letter, and Arial, a Sans Serif font that has no cross-lines. Typeface is the name given to the style of a particular set of letters, numerals, symbols and punctuation marks.

Formatting: The process of preparing a writeable disk for use. Formatting creates a structure on the disk which enables it to hold data.

Forum: Often used synonymously with Discussion List. An electronic forum on the Internet or an intranet enables users to post messages by email or via the Web for other users to read and respond to. See also Blog, Bulletin Board, Newsgroup, Wiki.

Freeware: Software that can be copied and used without payment to the author(s), although there may be some restrictions on distribution. See Shareware.
FTP: Abbreviation for File Transfer Protocol. This is the method, i.e. a software standard, used for transferring files from one computer to another via the Internet. FTP is also used as a verb in the sense "to transfer" (a file). See Anonymous FTP..

G

Gateway: See Portal.

GB: Abbreviation for Gigabyte.

Generic Software / Generic Application: This term normally refers to general-purpose software applications that are not designed for use in a specific subject area, e.g. a word-processor (e.g. Word), spreadsheet package (e.g. Excel), presentation software (e.g. PowerPoint) or database package (e.g. Access). See previous entry, Generic CALL.

GHz: Abbreviation for GigaHertz.

GIF: Abbreviation for Graphic Interchange Format. A file format used for storing simple graphics. GIF files use a palette of 256 colors, which makes them practical for almost all graphics except photographs. Generally, GIF files should be used for logos, line drawings, icons, etc, i.e. images that don't contain a rich range of colors. A GIF file containing a small number of colors tends to be quite small, but it will be big if the image has a wide range of colors, e.g. a photograph.GIF files are commonly used for storing images on the Web. GIF files are also suitable for storing animated (i.e. moving) images. See BMP, EPS, JPEG/JPG, TIFF.

Gigabyte: Usually abbreviated to GB, or gig in common computer parlance. A unit of measurement of computer memory or disk capacity = 1,073,741,824 bytes. See the entry on Measurement Units. See Bit, Byte, Kilobyte, Megabyte.

GigaHertz: Usually abbreviated to GHz. A unit of measurement relating to the Clock Speed of a computer or, put simply, a measurement of how fast its Central Processing Unit (CPU) runs. Typical clock speeds of modern computers range from 500 MegaHertz (500MHz) upwards. Faster clock speeds are normally expressed in GigaHertz (= 1000MHz). See Hertz, Microprocessor.

Google: A popular Search Engine. Probably the most widely used search engine on the Web. You can also use Google to find definitions of words. Call up Google at http://www.google.co.uk and in the search box: type define: immediately in front of the word you would like to be defined. Google will then locate definitions of that word on the Web, e.g. try define:bandwidth or define:ADSL. If your term consists of two or more elements, e.g. blended learning, encase it in inverted commas, thus: define:"blended learning". Blended Learning is also defined in this Glossary.

Gopher: A pre-worldwide-Web method of presenting information on the Internet. Gopher servers present a hierarchical set of menus, descending from one main menu, which lead to files and documents. The spectacular rise of the World Wide Web is driving the gopher into extinction. See Internet, World Wide Web.

Graphical User Interface (GUI): An Interface, i.e. a software package, that enables human beings to control what happens on their computers. A GUI consists of graphical elements known as icons and enables the user to run programs and to carry out other operations such as copying information from one Folder to another, deleting files, etc by clicking on these icons, opening and shutting windows and dragging and dropping with a mouse. Microsoft Windows and the much older Apple Mac interface are GUIs. Contrasted with Character User Interface (CUI), an older type of interface which required the user to control the computer by typing commands at the Keyboard. See Icon, Mouse, Operating System, Window, Windows.

Graphics Card: An alternative name for a Video Card.

GUI: Abbreviation for Graphical User Interface.

H

Hacker: A person who spends their time trying to gain access to information stored on other people's computers all around the world. Some hackers are just harmless browsing types, but others have more invidious aims such as grabbing details of your credit cards or bank account, which may be stored in a file somewhere on your computer. If you access the Internet regularly you should consider installing a Firewall to protect yourself against hackers.

Hardcopy or Hard Copy: Printed output from a computer, as opposed to output on screen.

Hard Disk: A hard disk consists of a single rigid magnetic disk or a set of such disks enclosed within a metal case, i.e. a hard disk drive, which is mounted internally in your computer and is used for storing the computer programs and data that it needs in order to work. External hard disk drives can also be obtained for additional storage capacity or backup storage. Hard disks can contain vast amounts of data, usually measured in gigabytes. See CD-ROM, DVD, Floppy Disk, Gigabyte, Storage Device.

Hardware: The physical elements of a computer system - the bits you can see, touch, drop, kick or fall over. Contrasted with Software.

HDD: Abbreviation for Hard Disk Drive. See Hard Disk.

Hertz: Usually abbreviated to Hz. A unit of measurement relating to the number of times something is repeated per second. In computer jargon this normally refers to the Clock Speed of a computer, i.e. in simple terms how fast the computer runs. One Hertz is one cycle per second. Computer clock speeds are normally expressed in MegaHertz (MHz) or GigaHertz (GHz). Named after the physicist and mathematician Heinrich Hertz (1857-1894), the discoverer of radio waves. The frequency of radio waves is also expressed in Hertz. You will also find the term Hertz used in connection with programs for producing digital audio recordings, where Hertz refers to the Sampling Frequency (also called sampling rate) at which the recording is made or stored.

Hit: A colloquial term which is often used to refer to a successful search for information on the Web, e.g. using a Search Engine, or the number of visits a site receives.
Homepage or Home Page: This is the main Web page of a business, organisation or school, or of a personal website. From this page links are made to other pages on the same site and to external sites. Most people usually set up their Browser to open with this page when it starts up. See Website, World Wide Web.

Host: Short for host computer. Any computer that provides services to other computers that are linked to it, via a local network or via the Internet.

Host Name or Hostname: A host name is the unique name of a computer on the Internet, which is normally written as a series of letters, for example www.hull.ac.uk. A host name is the human-friendly form of the host's numerical IP address, i.e. it's an alias for the "real" Internet address of the host computer, e.g. 150.237.176.24. See Domain Name, Host, Internet, URL, Website.

Housekeeping: This could be interpreted as going round with the feather duster and keeping your computer equipment free of dust, but in computer jargon it refers to organizing and managing the software installed on your computer system.

HTML: Abbreviation for Hypertext Markup Language. The coding system used for creating pages on the World Wide Web. HTML enables the author to control how the page appears and to insert Hypertext links within one Web page or to other pages anywhere on the Web. Nowadays most Web authors and designers use an Authoring Tool such as Front Page or Dreamweaver to create World Wide Web pages. Web page files end with the Extension .htm. or .html. See Anchor, Hyperlink, URL, World Wide Web.

HTTP: Abbreviation for Hypertext Transfer Protocol. The transfer method (protocol) used by the World Wide Web to transmit and receive Web pages. This abbreviation normally precedes the name of a website, e.g. http://www.ict4lt.org, to tell your computer that this is the way in which you wish to communicate with other computers on the Internet. In practice, however, you can usually miss out the prefix http:// as it is assumed to be the norm. See HTML, Hyperlink, Hypertext, Protocol, World Wide Web.

Hub: A common connection point for networked computers and other devices. Hubs are used to connect devices in a Local Area Network (LAN). See LAN.

Hyperlink: A contraction of hypertext link, the essence of Hypertext and the HTML language used for creating pages on the World Wide Web. In a Web document a hyperlink can be a sequence of letters or an image. By clicking on the area designated as a hyperlink by the person who created the Web page, it is possible to jump quickly to another part of the page, a different page on the same website, or to a completely different website. See Hypermedia. Hyperlinks can also be inserted into a Word document, enabling the reader to jump from one point in the document to another, or out of the document to a website. See Anchor.

Hypertext: A system for the non-sequential presentation of text, the fundamental concept of the World Wide Web, whereby the user can jump from one part of a text to another, from one Web page to another, or from one website to another, by clicking on highlighted (and usually underlined) hyperlinks. The concept of hypertext predates the Web by many years. Vannevar Bush is credited with inventing the concept of hypertext in his article "As we may think", which was written as early as 1945 and describes an imaginary machine called "Memex" - essentially a hypertext device that takes account of the way the human mind associates ideas and follows a variety of different paths rather than moving on sequentially. See Hyperlink, Hypermedia, HTML. See Section 2, Module 1.5, headed What is the World Wide Web?

I

Icon: A small symbol or picture used in a Graphical User Interface (GUI). The icons on the computer screen represent programs or files, e.g. a picture of a painter's palette might represent a program used for drawing and editing pictures, and a picture of a book with a question mark on its cover might represent the text of a manual or a help file. In a GUI the Mouse is used to move the Cursor so that it locates over an icon. Clicking a button on the mouse then causes the program that the icon represents to run or a file to be displayed.

ICT: Abbreviation for Information and Communications Technology. What the ICT4LT project is all about. See also C&IT and IT. ICT is the term that is currently favored by most businesses and educational institutions. The "C" reflects the important role that computers now play in communications, e.g. by email, the Web, by satellite and cellphone (mobile phone).

Ink Jet Printer: A type of Printer that fire little jets of ink at the page in order to form the characters and graphics. One of the commonest forms of printers currently in use and capable of producing high-quality output in black and white and in full color.
Input: Anything that goes into a computer in order to be processed and/or stored. Also used as a verb. See Output.

Input Device: Any device that is capable of inputting information into a computer system, e.g. a Keyboard, Microphone, Mouse or Scanner.

Install: A verb used to describe the process of installing or setting up a computer program or suite of computer programs on the computer's hard disk for first-time use. Programs are normally supplied on CD-ROM or DVD, but they may also be downloaded from the Web, either free of charge or on payment of a fee.

Install Program or Installation Program: A program that enables the user to install or set up a program or suite of computer programs on the computer's hard disk for first-time use. Also known as Setup Program. See Install, Uninstall, Uninstall Program.

Integrated Circuit: An electronic circuit etched onto a small piece of silicon which has been subjected, using photo-masking processes, to controlled "doping" with certain impurities. Particular areas of the chip can then be made to act like electronic components such as diodes, capacitors and resistors. See Microchip, Silicon Chip.

Intel: The name of a manufacturer of microprocessors used in personal computers. Other companies make Intel-compatible microprocessors. See Microprocessor.

Intelligent CALL: See ICALL (Intelligent CALL).

Interactive Video (IV): A system consisting of a computer connected to a 12-inch videodisc player, allowing the presentation of still images or video clips combined with some kind of interactivity, e.g. carrying out a set of exercises linked to the images or to the video clips. Very popular in the 1980s but now technically obsolete and replaced by integrated multimedia computers incorporating DVD or CD-ROM drives. One of the best known educational interactive videodiscs was the Domesday Disc, created by the BBC in 1987 to commmemorate the

900th anniversary of the creation of the Domesday Book (1087). See CD-ROM, Digital Video Disk, Multimedia Personal Computer (MPC), Videodisc.

Interactive Whiteboard (IWB): Often abbreviated to IWB. A touch-sensitive projection screen that allows the teacher to control a computer directly by touching the screen, i.e. the whiteboard, rather than using a Keyboard or Mouse. A Data Projector has to be connected to the teacher's computer in order to project the image onto the interactive whiteboard and special software has to be installed on the computer in order for the whiteboard to become active and sensitive to touch - which may require the use of an "electronic pen" or it may work in reaction to one's finger or hand.

Interface: An interface in computer jargon is a connection between two systems. It can be Hardware or Software. It may take the form of a plug, cable or socket, or all three, for example where a Printer or Scanner is connected to a computer, and then it's a hardware interface. There are also software interfaces that enable one program to link with another, passing across data and variables. The term interface, also known as user interface, also describes the software that is used to enable human beings to communicate with a computer, for example Microsoft Windows, which is a Graphical User Interface (GUI) in common use on personal computers. See Windows.

Internet: The Internet, or simply "the Net", is a computer network connecting millions of computers all over the world. It provides communications to governments, businesses, universities, schools and homes. Any modern computer can be connected to the Internet using existing communications systems. Schools and universities normally access the Internet via their own educational networks, but private individuals usually have to take out a subscription with an Internet Service Provider (ISP). Although the Internet is in fact a network of networks, it appears to users as a network of individual computers. The Internet dates back to the group of interconnected networks that evolved from the ARPANET of the late 60's and early 70's. It has grown from a handful of interconnected networks into a huge network of millions of computers. The main Internet services of interest to language teachers are Email and World Wide Web. See also Blog, Discussion List, Forum, Podcast. The World Wide Web is only part of the Internet, but many people treat both terms as synonyms. See Module 1.5, Introduction to the Internet, Module 2.3, Exploiting World Wide Web resources online and offline, Module 3.3, Creating a World Wide Web site.

Internet Explorer: A Browser produced by the Microsoft Corporation and supplied together with the Windows operating system.

Internet Service Provider (ISP): A company that provides a subscription service to enable you to access the Internet. An ISP has a network of computers permanently linked to the Internet. When you take out a subscription with an ISP they link your computer to their network, usually via an existing telephone line, but dedicated lines are also provided by some ISPs. ISPs also give you an Email address and space on the World Wide Web for setting up your own website.

Intranet: A private network inside a company or educational organisation and used over its LAN (Local Area Network). A sort of local Internet. Contrasted with Internet, which is publicly available.

I/O: Abbreviation for Input/Output. See Input, Output.

IP Address: Short for Internet Protocol Address. The unique numerical address of a computer on the Internet, expressed as four sets of numbers (maximum 3 digits each) separated by dots: e.g. 150.237.176.24 for one of the computers at the University of Hull - where the ICT4LT website is located. Computers on the Internet are nearly always referred to by more memorable domain names, which are mapped onto their IP addresses by special Internet computers known as name servers. See Domain Name, Host, Host Name, Name Server.

iPod: The name of a portable (mobile) Media Player designed and marketed by Apple. The iPod first appeared in 2001. As well as being capable of storing and playing back audio recordings, newer models can also record and play back video. The iPod has become popular for storing recordings, mainly music, downloaded from the Web or

transferred from audio CD to a computer and then moved across to an iPod using a software package known as iTunes: http://www.apple.com/itunes/.

ISDN: Abbreviation for Integrated Services Digital Network. A type of digital telephone service, used for transferring large chunks of data to and from the Internet without a Modem. Gradually falling out of use these days with the introduction of ADSL broadband services. ISDN lines normally operate at 128 Kbps, which is faster than a standard 56Kbps Dial-up Modem but slower than an ADSL connection, which runs at a speed of at least 512Kbps. See ADSL, Broadband, Kbps, Leased Line.
ISP: Abbreviation for Internet Service Provider.

IT: Abbreviation for Information Technology. Essentially, technology relating to information processing, i.e. computer technology, but see also ICT, C&IT, both of which describe the converging of information technology and communications technology. The term IT is rapidly being replaced by ICT in order to reflect the important role that information technology plays in communications by email, the Web, satellites and mobile phones.

J

Java: A programming language, invented by Sun Microsystems, that is specifically designed for writing programs that can be downloaded to your computer through the Internet and immediately executed. Using small Java programs, called applets, Web pages can include functions such as animations, interactive sequences, etc. You need to set up your browser to enable it to interpret and run the Java applets. Java is similar to a programming language known as C++ but it has been considerably simplified. Not to be confused with Javascript. See Applet.

Javascript: Javascript is a script language, a system of programming codes that can be embedded into the HTML code of a Web page to add functionality, e.g. interactive sequences, questionnaires, etc. Although it shares many of the features and structures of the full Java language, Javascript is essentially quite different and was developed independently.

Joystick: A device that looks a bit like a gear lever in a car. This is connected to a computer and is used mainly for controlling the Cursor in fast action games.

JPEG or JPG: Abbreviation for Joint Photographic Expert Group. Pronounced "Jaypeg". A file format used for storing images. The JPEG/JPG format uses a palette of millions of colors and is primarily intended for photographic images. The internal compression algorithm of the JPEG/JPG format, unlike the GIF format, actually throws out superfluous information, which is why JPEG/JPG files containing photographic images end up smaller than GIF files containing photographic images. If you store an image, say, of a flag containing just three colors in JPEG/JPG format it may end up bigger than a GIF file containing the same image, but not necessarily a lot bigger - it depends on the type and range of colors it contains. JPEG/JPG files containing photographic images are normally smaller than GIF files containing photographic images. JPEG/JPG files are commonly used for storing images on the Web. See BMP, EPS, GIF, TIFF.

K

Kb: Abbreviation for Kilobit.

KB: Abbreviation for Kilobyte. The single letter K is also used.

Kbps: Abbreviation for kilobits per second. A unit of measurement of data transmission speed, e.g. via a Modem. See Bit, Megabit.

Keyboard: The keyboard of a computer is used to enter information which the computer displays or processes. It looks much the same as a typewriter keyboard, but has a few additional keys that have special functions.

Kilobit: Usually abbreviated to Kb. A unit of measurement consisting of 1,024 bits, mainly relating to data transmission speed. See Bit, Megabit.

Kilobyte: Usually abbreviated to K or KB. A unit of measurement of computer memory or disk capacity = 1,024 bytes. See entry on Measurement Units. See Bit, Byte, Megabyte, Gigabyte.

L

LAN: Abbreviation for Local Area Network. A Network of computers at one site that provides services to other computers connected to it. A LAN is usually limited to an immediate area, for example the floor of a building, a single building or a campus. The most important part of a LAN is the Server that delivers software to the computers (also known as workstations or clients) that are connected to it. The server is usually the most powerful computer in the network Users of computers connected to a LAN can access their own files remotely and exchange information with the server and other users connected to the network. See Client, MAN, WAN, Web Server.

Laptop Computer: A laptop computer is a computer that is light and can easily be carried around. Contrasted with Desktop Computer. See Notebook Computer. See Netbook.
Laser Printer: A type of Printer that works by firing a laser at a rotating drum. Laser printers produce high-quality output at a reasonable speed.

LCD: Abbreviation for Liquid Crystal Display. A technology used for producing a type of flat panel computer Display Screen, which is replacing the older type of Cathode Ray Tube display screen. A more advanced form of technology for producing flat panel display screens is known as TFT (Thin Film Transistor). LCD and TFT screens are also used in digital cameras and camcorders. See Camcorder, Digital Camera.

Learning Platform: A term used to describe the software and systems that are used to deliver E-learning. Some confusion surrounds this term: sometimes it is used synonymously with Virtual Learning Environment (VLE) and sometimes with Managed Learning Environment (MLE). Many people use it as a catch-all term to describe software and systems designed to manage, deliver and provide access to E-learning materials.

Leased Line: Also known as a private circuit, is a dedicated communications link between two sites. It is separate from the public telephone network and reserved exclusively for the use of the owner, usually at a fixed tariff regardless of usage levels.
Leased lines are commonly used where there is high inter-site traffic, where there is a requirement for high Bandwidth, or where reliability and availability are critical considerations. See ADSL, Broadband and ISDN.

Linux: A Unix-type Operating System, similar to Windows and the Apple Mac operating system. Linux was originally created by Linus Torvalds with the assistance of developers around the world. The Source Code for Linux is freely available to everyone. See Unix.

Liquid Crystal Display (LCD): See LCD.

Local Area Network (LAN): See LAN.

M

Macro: A sort of mini-program that can be incorporated into other programs, comprising a series of keystrokes that you may wish to use over and over again. For example, if you perform a task repeatedly in Microsoft Word, you can automate the task using a macro. A macro is a series of commands and instructions that you group together as a single command to accomplish a task automatically. Instead of manually performing a series of time-consuming, repetitive actions, you can create and run a single macro - in effect, a custom command that carries out the task for you. A macro can be saved and called up whenever you need it. A degree of caution needs to be

exercised if you are given or sent a file, e.g. a Word DOC file, containing a macro, as macros can harbor viruses. Make sure you know where the file comes from. See RTF, Virus.

Mainframe Computer: Loosely speaking, a very large computer which can serve many users at remote terminals. See Microcomputer, Minicomputer.

Main Menu Bar: The main menu bar is normally located at the top of the screen when you are using an application such as a word-processor or Browser, consisting of a set of names of drop-down menus that enable a variety of different tasks to be carried out. See Menu Bar.

MAN: Abbreviation for Metropolitan Area Network. A network of computers located at different sites within a large fixed area, such as a city. See LAN, WAN.

MB: Abbreviation for Megabyte.
Mbps: Abbreviation for megabits per second. A unit of measurement of data transmission speed, e.g. via a Modem. A typical Broadband connection to the Internet transmits data at 1 Mbps to 8 Mbps. See Bit, Kilobit.

Media (pl.) / Medium (sing.): In computer jargon this term has two main senses: (1) Storage Media, e.g. CD-ROMs, DVDs, flash drives, etc - also referred to as Storage Devices, (2) Media in the sense of audio and video recordings in Digital format that can be played back on a Media Player. See Multimedia and Module 2.2, Introduction to multimedia CALL.

Media Player: Used in two main senses: (1) a program that enables your computer to record, store and play back audio and video recordings; (2) a device such as the portable iPod media player that is also used to record, store and play back recordings.

Megabyte: Usually abbreviated to MB. 1,024 kilobytes or 1,048,576 bytes. A unit of measurement of computer memory or disk capacity. Roughly 180,000 words of text - an average-sized novel. See entry on Measurement Units. See Bit, Byte, Kilobyte, Gigabyte.

MegaHertz: Usually abbreviated to MHz. A unit of measurement relating to the Clock Speed of a computer or, put simply, a measurement of how fast its Central Processing Unit (CPU) runs. Typical clock speeds of modern computers range from 500MHz upwards. Faster clock speeds are normally expressed in GigaHertz or GHz (= 1000MHz). See Hertz, Microprocessor.

Memory: Most people use this term to refer to a computer's temporary internal main memory or RAM. Memory may also refer to ROM (Read Only Memory), which is permanent and part of a a computer system as supplied by the manufacturer.

Memory Stick: A small electronic card, also known as a memory card, which is inserted into a Digital Camera or Camcorder for storing photographs or movie files that can then uploaded to a computer. This term is also used as an alternative to Flash Drive.

Menu: A list of options from which a computer user makes a selection in order to determine the course of events in a program. This usually involves keying in a single letter or number, or selecting text or an Icon with a Mouse. See Main Menu, Menu Bar, Toolbar.

Menu Bar: Most computer programs display a menu bar or set of menu bars at the top of the screen, from which choices can be made by the user to carry out certain operations, e.g. saving a File, printing a document, or setting up the program in different ways. See Main Menu Bar, Menu, Toolbar.

MHz: Abbreviation for MegaHertz.

Microchip: Also referred to as Chip or Silicon Chip. Invented in 1958 by Jack St. Clair Kilby, while he was working at Texas Instruments, Dallas, Texas: http://www.ti.com/corp/docs/kilbyctr/jackstclair.shtml. An electronic circuit etched on to a small piece of silicon which has been subjected, using photo-masking processes, to controlled "doping" with certain impurities. Particular areas of the chip can then be made to act like electronic components such as diodes, capacitors and resistors. See Integrated Circuit.

Microcomputer: A generic name for a class of computers distinct from bigger mainframe computers and minicomputers. Two of the defining characteristics of a microcomputer are that it should be built around one Microprocessor and that it should be standalone, i.e. capable of operating independently from any other computer or computer Network to which it might be connected. Modern Desktop and Laptop computers fall into this category. See Mainframe Computer, Minicomputer.

Microphone: Essential for making sound recordings in multimedia CALL programs. Microphones used in multimedia applications are much the same as those used with standard audiocassette devices. Choosing the right kind of microphone is vital. See Condenser Microphone, Dynamic Microphone.

Microprocessor: The microprocessor is the Central Processing Unit (CPU) of a computer, where all the data processing and calculations are carried out. It's a single silicon chip containing millions of transistors etched on to its surface, connected to the Motherboard by an array of pins at its base. See Silicon Chip.

Microsoft Office: A suite of programs produced by Microsoft Corporation, comprising a Word-processor (Word), a Spreadsheet (Excel), a Presentation Program (PowerPoint), an Email package (Outlook), a Database program (Access), and a Desktop Publishing package (Publisher).

Microsoft Windows: See Windows.

MIDI: Abbreviation for Musical Instrument Digital Interface. A format for synthesized music. Music in MIDI format is created and played through the use of synthesizers, unlike "real" music which is normally recorded in MP3, WMA or WAV format.

Minicomputer: Smaller than a Mainframe Computer and bigger than a Microcomputer. Small businesses often rely on minis. Minis can handle many users at once. Today's minis are much more powerful than yesterday's mainframes.

MMORPG: Abbreviation for Massively Multiplayer Online Role Playing Game, a type of Virtual World in which players adopt amazing characters to explore fantasy worlds. See MUVE. See Wikipedia: http://en.wikipedia.org/wiki/MMORPG

Modem: Short for modulator/demodulator. A device which converts computer data to a signal that can be transmitted over a standard telephone line. It can also reconvert a signal coming into a computer via a telephone line so that it can be understood by the computer. Modems are used to connect computers with the Internet.

Monitor: The screen on which output from a computer is displayed. Also referred to as Display Screen.

Moodle: A Virtual Learning Environment (VLE), also described as a Course Management System (CMS). The Moodle website is at http://moodle.org. Moodle is Open Source software, which means you are free to download it, use it, modify it and even distribute it. Moodle has its own Moodle for Language Teaching Community: http://moodle.org/course/view.php?id=31

Motherboard: The main electronic circuit board of a microcomputer, to which other circuit boards (also known as cards) can be connected in order to fulfil special functions, e.g. a Sound Card or Video Card. Typically, the motherboard contains the BIOS, CPU, RAM, ROM and all the controllers required to control standard peripheral devices, such as the Display Screen, Keyboard and disk drives.

Mouse: A pointing device that is used by moving it around on your desk and pressing (clicking) a button. Most mice have two buttons (left and right) but some have three. Apple Mac computers use a mouse with just one button. Moving the mouse causes a pointer or Cursor to move around the screen, and clicking a mouse button once or twice when the pointer is hovering over an icon or word activates a command, e.g. starts a computer program or initiates an action inside another program such as Microsoft Word. A mouse is used with computers that use a Graphical User Interface (GUI). See Pointing Device.

MP3: Abbreviation for MPEG Layer 3: see MPEG. MP3 is a file format for storing high-quality audio files that can be played back on computers and portable media players such as the iPod. MP3 has the advantage of taking up far less storage space than the WAV format without loss of quality. See also WMA, which is and alternative audio file format. See Media Player.

MP4: Abbreviation for the MPEG-4 file format. There are two basic types of MP4: MP4 AAC (Advanced Audio Coding) and MP4 AVC (Advanced Video Coding). The MP4 AAC file format is used to store audio files in a more manageable size without affecting the quality. MP4 AAC's best known use is as the default audio format of Apple's iPhone, iPod and iTunes Media Player: http://www.apple.com/itunes/. The MP4 AVC file format is used to store video files in a more manageable size without affecting the quality. It is also increasingly being used for storing video on iPods and similar portable devices. See MPEG.

MPEG or MPG: Abbreviation for Motion Picture Expert Group. Pronounced "Empeg". A standard file format for storing movies in digital format and high-quality audio files in a variation known as MP3. Video files stored MPEG format can be recognized by the Extension .mpg or .mpeg. MP3 audio files can be recognized by the Extension .mp3. A newer file format is MP4. MP4 files that can be recognized by the Extension .mp4. See ASF, AVI, MOV, RM, which are alternative video file formats. See http://www.mpeg.org, a reference site for MPEG, with explanations of different MPEG formats and links to sources of media players.

MPG: A contracted form of MPEG.

MS DOS: Abbreviation for Microsoft Disk Operating System. An operating system for the personal computer, written by Microsoft Corporation, but now superseded by Microsoft Windows. MS DOS is a character-based system, whereby the user has to type commands at a prompt.

Multimedia: The integration of two or more types of information (text, images, audio, video, animation, etc.) in a single application. See Hypermedia, Media.

Multitasking: The execution of more than one program, apparently at the same time, on a computer. In reality, however, the computer rapidly switches its attention from one program to another, thus dividing its time. Multitasking makes it possible, for example, to print one word-processed document while working on another. Another form of multitasking allows you to open several different windows in which different programs can be run, but only one window is the active window. See Window and Windows.

N

Name Server or Nameserver: Also known in full as Domain Name Server. A special type of Internet computer which converts a website's domain name into a unique numerical IP Address that identifies the computer where the website is stored. When you try to connect to a website with a domain name such as hull.ac.uk (University of Hull), a request is first made to a name server to resolve this name into an IP address, which is then used to locate the computer where the website is stored and to establish a connection with it. See Domain Name, Host Name, IP Address.

Narrowband: A term used to describe a slow-speed connection to the Internet, normally via a Modem and less than or equal to 64 Kbps. Contrasted with Broadband. See Kbps.

Navigation: This describes the process of finding your way, i.e. navigating, around a series of menus within a computer program or finding your way around the World Wide Web by means of a Browser.

Nerd: A colloquial term describing a computer boffin. Unlike other terms such as Anorak, Geek, Techie and Trainspotter, the term nerd has acquired mainly positive connotations in recent times, as in the 1996 TV series "Triumph of the Nerds: the Rise of Accidental Empires", which tells the history of the rise of the computer boffins such as Microsoft's Bill Gates and Apple's Steve Jobs, both of whom are described as nerds: see http://www.pbs.org/nerds

Netbook: A netbook is a small, lightweight computer, smaller than a Laptop Computer, with a long battery life and ideal for travelling. Netbook computers have built in Wifi and are optimized for browsing the Web and Email.

Netiquette: Etiquette on the Internet. An code of behavior for people communicating by email via the Internet. There are several useful publications relating to netiquette.

Netizen: Derived from the term citizen, referring to a citizen of the Internet, or someone who uses networked resources. The term connotes civic responsibility and participation.

Netscape: An early Web Browser, which first appeared in 1994, shortly after the World Wide Web went public.

Network: A group of computers connected together, either by physical connections such as cables, or by wireless connections (see Wifi). The Internet is a worldwide network of computers to which virtually any computer can be connected. See Intranet, LAN, MAN, WAN, World Wide Web.

Newsgroup: A type of public online forum which anyone can read and contribute to. All users of a newsgroup can post messages, and every user can read all the messages that have been posted. Many newsgroups are distributed worldwide by the Usenet system: http://www.usenet.org.uk. Newsgroups have now been superseded to a large extent by blogs and electronic discussion lists.

Notebook Computer: A type of Laptop Computer, but lighter and thinner - and therefore easy to carry around. See Netbook, an even smaller and lighter computer.

O

Offline: Not connected to a computer or network of computers. Often used in the sense of working with software stored on a stand-alone computer. For example, if you use a package such as Microsoft Word you are working with offline software, and if you use learning materials stored on CD-ROM you are also working offline. Contrasted with Online.

Online: Connected to a computer or network of computers, especially the World Wide Web. Often used in the sense of working with software stored at a remote location. For example, if you use learning materials stored at a website you are working online. Constrasted with Offline.

Online Learning: The use of the Internet to follow a course that usually results in the award of a diploma or certificate. Closely associated with the concept of E-learning, which often - but not necessarily - implies some form of online learning, i.e. using Email and the World Wide Web. E-learning, i.e. electronic learning, is a broader term, embracing the use of ICT in general in teaching and learning as well as online learning.

Open Source: Used to describe Software that is provided free of charge, along with the original Source Code used to create it so that anyone modify it to improve it and work in ways that reflect their own preferences. Moodle is a typical example of open source software.

Optical Character Recognition (OCR): OCR software is used conjunction with a scanner to convert printed text into digital format. For example, a page from a printed book can be placed on the scanner and the OCR software will be used by the scanner to detect the individual words from which it is made up and then convert them into a form that can be stored on a computer, e.g. a Word document. A great time-saver! See Scanner.

Optical Disk or Optical Disc: The generic name for a type of computer disk which uses a laser to read and write data. See CD-ROM, Digital Video Disk, Videodisc, all of which are optical disks.

OS: Abbreviation for Operating System.

Outlook: A popular Email program, part of the Microsoft Office suite of programs.

P

Pathname: The pathname of a File on a computer specifies exactly its position on disk, and consists of at least three parts: (i) drive letter, (ii) directory, and (iii) filename, e.g. c:\windows\user.exe. One or more subdirectories may also be included in a pathname, e.g. c:\windows\system\user.exe. See Directory, Folder.

PC: Abbreviation for Personal Computer.

PDA: Abbreviation for Personal Digital Assistant. A handheld device that combines computing, telephone/fax, and networking features and serves as an organizer for personal information.

PDF: An abbreviation for Portable Document Format. This is a file type created by Adobe that allows fully formatted, documents to be transmitted across the Internet and viewed on any computer that has Adobe Acrobat Reader software - a proprietary software viewing program available for free at the Adobe website: http://www.adobe.com/uk/. Businesses and educational institutions often use PDF-formatted files to display the original look of their brochures or for publishing a complete magazine in electronic format. Using the full Adobe Acrobat software package, it is possible to create a high-quality piece of artwork or a brochure which preserves the look of the original, complete with fonts, colors, images, and formatting. Documents in PDF format can be published on the Web without having to be converted into HTML. PDF files can be distributed via email, CD-ROMs and local area networks. They can also contain hyperlinks,

Pentium: A generic name for a faster type of Personal Computer that superseded the earlier 486 range of slower computers. Essential for running modern multimedia software and accessing the Internet.

Peripheral Device: Often abbreviated to peripheral. Virtually any device which can be connected to a computer. This term includes modems, printers, scanners, interactive whiteboards, etc. See Interactive Whiteboard, Modem, Printer, Scanner.

Personal Computer: The generic term for IBM-compatible microcomputers. See Microcomputer, Multimedia Personal Computer.

Pixel: A contraction of picture element. What you see on a computer Display Screen is made up of thousands of colored pixels or small dots, which can be set according to the user's choice to produce either low-resolution output, medium-resolution output or high-resolution output, the usual combinations of pixels across each line of the screen (horizontal pixels) and down each line of the screen (vertical pixels) being 640 x 480, 800 x 600, 1024 x 768, 1280 x 1024. Thus, the more pixels on the screen the higher the resolution (i.e. producing a finer, sharper image) and the greater the variety of colours that can be displayed. See Bitmap, Resolution, Vektor Graphic.

Platform: Often used as an alternative term for a computer system, including both the hardware and the software. Essentially this term describes something that is used to build something else. The term platform-independent - used to describe software - means that the software can be run on any computer. The term learning platform refers to the technology used to provide a single online location at which course resources can be made available to learners These resources can include course materials, communications tools such as Email and Conferencing, and a storage area for learners' work. The term Virtual Learning Environment (VLE) may also be used synonymously with the term Learning Platform.

Plug-in: An extra piece of software that a Web Browser needs to run certain elements of a Web page. Web pages incorporating multimedia files often need to use Flash Player, QuickTime, RealPlayer or Shockwave Player as plug-ins. Sites that require a plug-in usually provide a link to a site from which the essential plug-in can be downloaded.

Pointing Device: A device which allows the user to control the position of the Cursor on a computer screen by physical manipulation of the device in different directions. See Joystick, Mouse, Trackball, all of which are pointing devices.

Pop-up: A small Window that appears within a program or over the top of a Web page to deliver additional information. Pop-ups on the Web can be annoying as they are often used for unwanted advertising material.

Portal: A Web page, website or service that acts as link or entrance to other websites on the Internet. Typically, a portal includes an annotated catalogue of websites and may also include a Search Engine, Email facilities, a Forum and other services. Also known as a Gateway.

PowerPoint: The name of a Presentation Program forming part of the Microsoft Office suite of programs.

Presentation Program / Presentation Software: Used to describe software such as PowerPoint, part of the Microsoft Office suite of programs. Presentation Software is used in conjunction with a Data Projector and a wall screen or Interactive Whiteboard in order to display a series of slides relating to a business presentation, a lesson or lecture.

Printer: More or less self-explanatory. An external device attached to a computer for device for producing printed output or Hardcopy. See Dot Matrix Printer, Ink Jet Printer, Laser Printer, Postscript Printer.

Printout: Anything produced on a printer after being processed by a computer program. See Hardcopy.

Processor: See Central Processing Unit (CPU), Microprocessor.

Projector: See Data Projector.

Protocol: In Internet terminology protocol usually refers to a set of rules that define an exact format for communication between systems. For example the HTTP protocol defines the format for communication between Web browsers and Web servers. See also Browser, FTP, HTTP, Server.

Public Domain: Material that is copyright free, whose copyright has expired, or which cannot be copyrighted. Many people think that because something is on the Web it must be in the public domain. This is not so. A work is in the public domain only if it is explicitly stated to be so. You may be lucky to find material on the Web that is stated to be copyright-free or in the public domain, and then the terms of using it are much more liberal. Look for a clear statement saying "The materials on this website are in the public domain" or something similar. If you wish to use materials from someone else's website, check the terms of use, which you will usually find at the bottom of the Web page or via a clickable link at the bottom of the page. See Copyright.

Q

QuickTime: Software used for viewing movies and listening to audio recordings: http://www.apple.com/quicktime. QuickTime is often needed as a Plug-in, when you are accessing audio or video materials on the Web. See also RealPlayer

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R

RAM: An acronym for Random Access Memory, referring to the dynamic memory in the silicon chips in a computer. RAM chips are the memory chips used as the temporary working area for running and developing programs. Data in RAM can be read and written to (i.e. changed) in microseconds, as opposed to the much slower data access times for disks, but RAM's contents disappear the moment the computer is switched off. The more RAM a computer has, the more flexibility the user has. RAM used to be measured in kilobytes (KB) but now it is usually expressed in megabytes (MB) and even gigabytes (GB). The amount of RAM a PC has could crudely be thought of as its "mental capacity". See Gigabyte, Kilobyte, Megabyte. See ROM.

Random Access Memory (RAM): See RAM.

Read Only Memory (ROM): See ROM.

RealPlayer: A Media Player used for listening to audio and video clips: http://uk.real.com/realplayer/. See Plug-in. See also QuickTime.

Resolution: A measure of the number of pixels or small dots displayed on a computer display screen, printer or scanner. One normally talks in terms of the quality of resolution, using the expression low-resolution, medium-resolution and high-resolution. The resolution of a computer display screen is normally expressed as two numbers representing the horizontal and vertical resolution, i.e. dots across each line of the screen and down each line of the screen: e.g. 640 x 480, 1024 x 768, etc. The resolution of a Printer is normally referred to by the number of dots per inch (dpi) - i.e. square inch. See Bitmap, Colour Depth, Display Screen, dpi, Pixel, Scanner, Vektor Graphic.

Rip: To extract or copy data from one format to another. The most common example is found in the phrase "to rip a CD", which means to copy audio tracks from an audio CD and save them to hard disk as WAV, MP3 or other audio files, which can then be played, edited or written back to another CD.

Robot: See Crawler.

ROM: Acronym for Read Only Memory. ROM chips in a computer contain data and programs as supplied by the manufacturer that can be accessed but not changed, i.e. they are read-only. ROM is also used to describe CD-ROMs. Originally CD-ROMs contained data and programs that could not be changed or erased, and new data and programs could not be stored on them, but modern CD-ROM drives allow certain types of CDs (and also DVDs) to be written to as well as read - so the term has become a misnomer in this respect. See also RAM on the difference between RAM and ROM.

Root Directory: The topmost directory in the directory hierarchy, from which all other directories are descended. On a PC's hard disk this has the pathname C:\. See Directory.
Router: A hardware device that connects computers to a Network or that connects one network with another network. Routers are now available at low prices and can be used for connecting two or more computers together in home networks, so that data can be exchanged between the computers on the network and so that all the computers in the network can access the Internet.

RTF: Abbreviation for Rich Text Format, an alternative way of storing a document created with a Word-processor. RTF-formatted files can be moved relatively easily between different computer systems. RTF format is also recommended when transmitting an Attachment by Email as it is much safer than the Microsoft Word DOC format,

which can harbour Word Macro viruses. RTF files preserve most of the formatting contained in DOC-formatted files. See Virus.

S

Scanner: A device used to convert hard copy, e.g. a printed page, photograph or photographic negative, into a form that can be stored on a computer. For further information and an illustration. See Optical Character Recognition (OCR).

Screen: See Display Screen, Monitor.

Scroll: To move up and down or from side to side through a document or a Window to view or access all of its contents

Search Engine: A search facility provided at a number of sites on the World Wide Web. Search engines enable the user to search the whole of the Web for key words and phrases and to locate related websites. This is a useful facility for locating information. Commonly used search engines are provided by Alta Vista, Ask, Google, Lycos and Yahoo.

Second Life: One of the fastest growing "virtual worlds" on the Web. See the entry in this Glossary under MUVE. The Second Life website is at: http://secondlife.com. See also SLURL.

Server: A computer which provides services to other computers, which are known as clients. For example, when you click on a link in a Web page your Browser sends a request to a remote computer, known as a Web Server, that serves the requested page to your browser, which then displays it on your computer screen. A Local Area Network (LAN) has a server that delivers software to the computers (also known as workstations) that are connected to it. It is usually the most powerful computer in the network Users connected to a LAN can access their own files remotely and exchange information with the server and other users connected to the network. See Client, Web Server.

Setup Program: A program that enables the user to set up a program or suite of programs on the computer's hard disk. Also known as Install Program or Installation Program.

Shareware: Try before you buy software. A Shareware application can be freely copied and used without payment to the author(s), but you are encouraged to pay a registration fee if you use it regularly. Shareware is often a cut-down copy of the fully-featured application, which can only be obtained by paying the registration fee. See Freeware.

Simulation: A type of program that simulates a real-life situation, allowing the user to carry out experiments which could have dangerous consequences or which are impractical in a normal learning environment. An early example of a simulation for language language purposes was Granville, a program dating back to the 1980s in which the learner was asked to imagine that he/she had won a holiday in Granville, France, and had to survive for a number of days on a limited budget. The border line between simulations and adventure games is rather fuzzy. The latter tend to be set in fantasy worlds, whereas the former are more down-to-earth. See Adventure Game, Maze.

Social Media: Term used to describe a variety of Web 2.0 applications that enable people to share images, audio recordings and video recordings via the Web and to initiate discussions about them. See JISC's Web2practice video on Blip TV: http://web2practice.jiscinvolve.org/social-media/

Social Networking: A term applied to a type of website where people can seek other people who share their interests, find out what's going on in their areas of interest, and share information one another.

Software: The opposite to Hardware. A generic term describing all kinds of computer programs, applications and operating systems. Software is not tangible, being a set of instructions written in a Programming Language comprising a set of instructions that the computer executes. See Application, Computer Program.

Sound Card or Soundcard: A card, i.e. an electronic circuit board, inside a computer that controls output to speakers or headphones and sound input from a Microphone or other source. A sound card is essential for multimedia applications. Also known as Audio Card.

Source Code: The human-readable form of a computer program, which is converted into binary computer instructions by a compiler or interpreter. See Compiler, Computer Program, Interpreter, Machine Code.

Spam: Unsolicited email advertisements, the Internet equivalent of junk mail.A spammer is someone who sends out spam. A spammer can email an advertisement to millions of email addresses, newsgroups, and discussion lists at very little cost in terms of money or time. The term spam comes from a sketch in the Monty Python's Flying Circus TV series. See Adware, Spambot, Spyware. See http://www.camsoftpartners.co.uk/bugs.htm.

Spambot: A spambot is a program designed to collect email addresses from the Internet in order to build mailing lists for sending Spam. A spambot is a type of Web Crawler that can gather email addresses from websites, discussion list and forum postings, and chat-room conversations.

Speech Recognition: A branch of Human Language Technologies (HLT) devoted to developing programs and devices that enable computers to recognise, analyse and transcribe human speech. See Automatic Speech Recognition (ASR), Speech Synthesis.

Spellchecker or Spell-checker: An electronic dictionary, usually part of a Word-processor, which scans the text entered by the user and highlights any word that it does not recognize. The author of the text is then given the option to correct, ignore or add any highlighted word to the dictionary. Spellcheckers can be set to accommodate different varieties of a language, e.g. British or American English, and many other languages. Many email packages also include a spellchecker.

Spider: See Crawler.

Spreadsheet: Essentially an accounting program, e.g. Excel, which forms part of the Microsoft Office suite of programs. Such programs might, at first sight, not appear to have a great deal to offer the language teacher, but bear in mind that they can also be used for organizing vocab lists and for maintaining students' marks or grades.

Spyware: A term that may be used synonymously with adware but it implies more sinister motives on the part of the person who has dumped it onto your computer, e.g. with a view to stealing private information such as bank account numbers, credit card numbers, passwords, etc. See Adware, Spam. See http://www.camsoftpartners.co.uk/bugs.htm, where tools for removing adware and spyware are described. Spybot Search & Destroy (Spybot S&D) is a free program designed to find and remove spyware stored without your knowledge on your computer: http://www.safer-networking.org

Storage Device: Equipment used for accessing and recording (i.e. storing) computer programs, texts, images, audio recordings and video recordings, etc in Digital format. Examples of storage devices include CD-ROMs, DVDs, Floppy Disks, Flash Drives. Older storage devices, such as the vinyl gramophone record, audiocassette tape, videocassette tape and 12-inch Videodisc, store information in Analogue format. The term Storage Medium is often used in the same sense as Storage Device.

Storage Medium (sing.) / Storage Media (pl.): A medium (pl. media) which is used to record (i.e. store) computer programs, texts, images, audio recordings and video recordings, etc. Examples include CD-ROMs, DVDs, and Flash Drives Often used in the same sense as Storage Device. although, strictly speaking, the device is the actual equipment, e.g. a CD-ROM drive, whereas the medium is the CD-ROM disk itself.

Streaming: Playing audio or video in real time from a website. In order to play streaming multimedia files you need a specific Plug-in program that links in with your Browser and plays the file as it is transmitted rather than downloading it to your computer first. Streaming requires a Broadband connection to the Internet since multimedia files are not stored on your computer but played in a continuous stream direct from the computer where they are stored.

Synchronous: "At the same time". Often used to refer to communication in a Chat Room or via Videoconferencing, where the participants have to be present at their computers at the same time. See Asynchronous, Conferencing.

Sysadmin: A contraction of Systems Administrator, the person responsible for managing a computer system.

T

Tag: Tagging has become more common in recent years as a result of the widespread use of Social Media for sharing images, audio recordings, video recordings, website references, etc. Tags are labels that briefly describe the what the media or references are all about and help other people find them quickly. Tags are also used in HTML, to define how the onscreen text is rendered by the browser: for example the tag ICT4LT in HTML appears as ICT4LT, with the tag hidden to the person viewing the Web page.

TCP/IP: Abbreviation for Transfer Control Protocol / Internet Protocol. The main data transfer protocol used on the Internet. See Internet, Protocol.

Techie or Tekkie: A colloquial term that is used both positively and negatively. When used positively, it is closely allied to Nerd, suggesting someone who is highly skilled in computer technology. When used negatively, it is closely allied to Anorak or Trainspotter, suggesting someone who is interested in computers only for technology's sake rather then what they can be used for. See also Geek.

Telnet: A program which allows you to log in to a remote Host computer and carry out the same commands as if you were using a terminal at the host site.

Text File or Textfile: A data file consisting entirely of printable ASCII characters, i.e. plain unformatted text. Text files often have a .txt Extension after the filename (e.g. readme.txt) and their contents can be viewed using programs such as Windows Notepad. The term text file is also used to describe files, i.e. texts, created by authoring packages such as Fun with Texts, which then manipulates the texts into a set of activities for completion by the learner. See ASCII, Binary File.

Text Manipulation: Text-manipulation programs have been popular with language teachers since the early 1980s. They consist of a set of activities for the learner, typically consisting of Cloze, gap-fillers, line re-ordering, decoding and total text reconstruction, also known as: Total Cloze. In most text manipulation programs the teacher inputs the text, and the computer then creates the activities - or most of them - automatically. See also Gap-filler.

Toolbar: A toolbar is a type of Menu Bar, normally located at the top of a computer screen, that contains icons for the most commonly-used commands in an application, e.g. in a word-processor or Browser. Typically, a toolbar appears under the Main Menu Bar, which normally consists of set of names of drop-down menus. See Icon.

Touch-sensitive Screen: A Display Screen which enables the computer to react to the touch of a finger. Useful, for example, in programs involving maps, where the learner may be asked to touch part of the map to show where a town, river or mountain is located.

Trackball or Tracker Ball: A Pointing Device. A sort of upside-down Mouse, with the ball facing upwards. The user manipulates the track of the Cursor on the screen by moving the ball with the palm of the hand or fingers.

Trojan: Trojans are programs - usually malicious - that install themselves or run surreptitiously on a victim's machine. They do not install or run automatically but may entice users into installing another program. e.g. a game, that actually installs a hostile piece of software and causes considerable damage to your computer. The name derives from Trojan Horse, the hollow wooden horse in which, according to legend, Greeks hid and gained entrance to Troy, later opening the gates to their army. See Virus, Worm.

Twitter: A Microblogging facility that allows users to post very short texts (maximum 140 characters) containing snippets of information about what they are doing at a given moment, news items, links to websites or comments on events, e.g. conferences and courses: http://twitter.com

Typeface: See Font.

U

Unicode: The Unicode Worldwide Character Standard is a character coding system designed to support the interchange, processing, and display of the written texts of the diverse languages of the modern world. In addition, it supports classical and historical texts of many written languages: http://www.unicode.org. See ASCII and ANSI. Section 5, Module 1.3, headed Typing foreign characters.

Uninstall: A verb used to describe the process of removing an unwanted application from your computer's hard disk. See Install, Installation Program, Uninstall Program.
Uninstall Program: Basically what it says: a program for removing (uninstalling) an unwanted application from your computer's hard disk. Install, Installation Program, Uninstall.

Universal Serial Bus (USB): A means of connecting a wide range of devices, e.g. Digital Cameras, Camcorders, iPods, mobile phones, Scanners and Printers, via a cable to a computer. USB ports, to which the cables are connected, are found on all modern computers A USB Port takes the form of a socket into which a plug at one end of the cable can be inserted. The plug at the other end varies according to the device that you are using. USB ports can also deliver power to devices that need it, so that separate power cables are not necessary.

Unix: An Operating System widely used on large computer systems in corporations and universities, on which many Web servers are hosted. A PC version of Unix, called Linux, is becoming increasingly popular as an alternative to Windows. See Web Server.
Upload: To transfer a copy of a computer program, a text file, an image file, a sound file or a video file from one computer to another computer. This term can also be used to describe the process of: (i) transferring a photograph from a digital camera to a computer, (ii) transferring a sound recording from a digital sound recorder to a computer, and (iii) transferring a video recording from a Camcorder or Digital Camera to a computer. See Download, which has the opposite meaning.

URL: Abbreviation for Uniform Resource Locator. Also known as a Web Address. A URL contains the location of a resource on the Internet. A URL specifies the address of the computer where the resource is located, which may be the homepage of a website, e.g. http://www.ict4lt.org, or a sub-page, e.g. http://www.ict4lt.org/en/en_mod2-1.htm. The http:// prefix can usually be omitted from a URL when it is entered in a Browser. See also SLURL and Website.

USB: Abbreviation for Universal Serial Bus.
User-friendly: Mainly used to describe Software. Software that is easy to use and offers guidance if the user does silly things is described as user-friendly. This term may also be applied to certain types of Hardware.

User Interface: See Interface.

V

VGA: Abbreviation for Video Graphics Adaptor. An older type of Video Card or circuit board used to control the output on a computer Display Screen. VGA cards were superseded by SVGA cards.

Video Card: An electronic circuit board inside a computer, which controls the display on the Monitor, i.e. the computer screen. Video cards are usually add-on cards inserted into expansion slots, although sometimes video circuitry is incorporated into the Motherboard. Also referred to as a graphics card.

Videoconferencing or Video Conferencing: A computer-based communications system that allows a group of computer users at different locations to conduct a "virtual conference" in which the participants can see and hear one another as if they were in the same room participating in a real conference.

Videoconferencing: a synchronous communications medium. See Audioconferencing, Conferencing, Webcam.

Video Memory: The dynamic memory available for the computer's Display Screen. The greater the amount of memory, the greater the possible colour depth and resolution of the display. Also known as Video RAM (VRAM). See Colour Depth, RAM, Resolution.

Virtual Learning Environment (VLE): A VLE is a Web-based package designed to help teachers create online courses, together with facilities for teacher-learner communication and peer-to-peer communication. VLEs can be used to deliver learning materials within an institution or within a local education authority. They may even address a wider constituency, and can even be used on a worldwide basis. VLEs have certain advantages in terms of ease of delivery and management of learning materials. They may, however, be restrictive in that the underlying pedagogy attempts to address a very wide range of subjects, and thus does not necessarily fit in with established practice in language learning and teaching. For this reason some critics argue in favour of a less restrictive Personal Learning Environment (PLE). The two most widely used VLEs in language teaching and learning are Blackboard and Moodle. VLEs may also be referred to as Course Management System (CMS), Learning Management System (LMS), Learning Platform and Learning Support System (LSS). Compare also Managed Learning Environment (MLE). See Blended Learning, Distance Learning, Online Learning. See the following ICT4LT modules:

Virtual Reality: The simulation of an environment by presentation of 3D moving images and associated sounds, giving the user the impression of being able to move around with the simulated environment. Users wear helmets and visors that convey the images and sound and gloves that give them the experience of touching objects. The film Lawnmower Man (1992) focused on a character experiencing virtual reality, albeit with negative consequences. See Wikipedia: http://en.wikipedia.org/wiki/Virtual_reality

Virtual World: A type of online three-dimensional imaginary world or game in which participants and players adopt amazing characters or avatars and explore the world, engaging in chat or playing complex games.

Virus: If you surf the Web, use email or Storage Media sent to you by other people, you need to be protected against virus invasions. A virus is a nasty program devised by a clever programmer, usually with malicious intent. Viruses can be highly contagious, finding their way onto your computer's hard drive without your being aware of it and causing considerable damage to the software and data stored on it. Viruses can be contracted from files attached to email messages, e.g. Microsoft Word files, or direct from the Web. Be very wary of opening an email attachment of unknown origin, as this is the commonest way of spreading viruses. Software used to protect your computer against the invasion of computer viruses is known as anti-virus software. See Firewall, Hacker, Worm. See http://www.camsoftpartners.co.uk/bugs.htm, where ways of combating viruses are described.

W

WAN: Abbreviation for Wide Area Network. A network of computers located at geographically separate sites. See LAN, MAN.

WAV: Short for Waveform Audio Format. A format for storing high-quality audio files. Somewhat hungry in terms of storage space compared to the MP3 and WMA audio file formats. See Media Player.

Web: See World Wide Web.

Web Address: See URL.

Webcam: A camera connected to a computer and linking it to the Internet. Webcams can be set to transmit a live picture every few minutes from a location to a website, displaying a live view of a landscape, cityscape or interior of a building, or they can be used in Videoconferencing.

WebCT: A Virtual Learning Environment (VLE). Blackboard and WebCT announced an agreement to merge in October 2005. Effectively, Blackboard has now taken over WebCT.

Weblog: The full form of the term Blog.

Webmail: A facility for creating, sending and and receiving messages via the Internet.Webmail offers an alternative to using email software such as such as Outlook or Eudora: see Email. In order to use webmail you have to register with an Internet Service Provider (ISP) and you can then access their email service via your Web Browser.

Web Server or Webserver: A computer or a software package running on a computer that delivers, i.e. serves, Web pages to its clients: see Client and Host. Every Web server has an IP Address and possibly a Domain Name. For example, if you enter the URL http://www.ict4lt.org/index.htm in your Browser, this sends a request to the Server whose domain name is ict4lt.org. The server then fetches the page named index.htm and sends a copy of it to your browser. Any computer can be turned into a Web server by installing Web server software and connecting the machine to the Internet. By far the most popular Web server software in use worldwide is the Open Source Apache software: http://www.apache.org

Website: An area on the World Wide Web where an organisation or individual stores a collection of pages of material - Web pages. The pages are usually interlinked with one another and with other websites. Every website has a unique Web Address or URL. The full URL of the ICT4LT website is http://www.ict4lt.org

Whiteboard: See Interactive Whiteboard.

Wide Area Network (WAN): See WAN.

Wifi: Wireless Fidelity, also known as wireless networking, a way of transmitting information without cables that is reasonably fast and is often used for laptop computers within a business or a university or school campus instead of a Local Area Network (LAN) that uses cable connections. Wifi systems use high frequency radio signals to transmit and receive data over distances of several hundred feet. Many hotels and airports now offer wifi access to people travelling with laptop computers.

Wiki: A website or similar online resource which allows anyone to set up a resource in which content can be created collectively. It's important feature is that it allows anyone who views the wiki to add to or edit the existing content as if they were adding to or editing, for example, someone else's Word document. Wiki also refers to the software used to create such a website. The word "wiki" derives from the Hawaiian "wiki-wiki", meaning "quick". Wikipedia is the best known example of a wiki. It's a collaboratively written encyclopedia: http://www.wikipedia.org. There is an article on Computer Assisted Language Learning in Wikipedia, which you can add to or edit yourself: http://en.wikipedia.org/wiki/Computer-assisted_language_learning. It is also possible to set up a personal wiki that cannot be added to or edited by other people, e.g. here is Graham Davies's personal wiki: http://grahamdavies.wikispaces.com.

Window: An area of a computer screen set aside for a special purpose. Modern computers, such as the Macintosh and most personal computers, divide the screen into discrete sections, known as windows, within which different pieces of software can be run at the same time - although not necessarily strictly at the same time, as normally only one window is active: see Multitasking. The user can control the size, shape and positioning of each window. Data, e.g. a piece of text, a picture or numerical data, can be moved or copied and pasted from one window to another. See Windows.

Windows: The name of a range of several different Graphical User Interface (GUI) operating systems produced by the Microsoft Corporation. Windows 3.0 and Windows 3.1 were the first operating systems of this type, produced by Microsoft, to appear in the early 1990s. The Apple Macintosh computer, however, had been using a GUI (which was not known as Windows) from the mid-1980s. Microsoft Windows is currently the most widely used GUI for personal computers. It exists in various versions, e.g.Windows 95, 98, ME, NT, 2000 and XP. See MS DOS, Operating System.
Windows Explorer: Microsoft's tool, provided as part of Windows, that enables you to inspect and manage folders and files stored on your computer. My Computer is an alternative tool, also provided as part of Windows. See File, Folder.

Wireless Fidelity: See Wifi.

Wireless Mouse: A Mouse that does not require a cable connection to a computer, but which operates via infrared or radio signals.

Wizard: Software that guides the user step-by-step through a complex task, such as setting up software on a network or configuring a printer to output data in a special format, e.g. for printing labels from a database program.

WMA: Abbreviation for Windows Media Audio. Microsoft's audio encoding format which offers high-quality output with lower file sizes. See MP3, WAV, which are alternative audio file formats. See Media Player. See Section 2.2.3.3, Module 2.2, headed Sound recording and editing software.

Word: A popular word-processing package, produced by Microsoft. See Word-processor.

Word-processor: Probably the most widely used computer Application. Modern word-processors allow the user to create fine-looking documents including images, tables, photographs, and even sound and video recordings if they are to be viewed on screen rather than from the printed page. In many respects they are similar to Desktop Publishing applications. Word-processors normally include a spellchecker, a grammar checker, a style checker and a thesaurus, as well as tools for writing in HTML, the coding language used for producing Web pages. Word-processors have been widely used in teaching and learning foreign languages ever since they first appeared. See Module 1.3, Using word-processing and presentation software in the Modern Foreign Languages classroom.

Workstation: A term that is rather loosely used these days. Most people use it in the context of any computer that forms part of a Network. Formerly, this term was applied to a particular type of powerful computer used for scientific and engineering calculations, e.g. the Sun Workstation.

World Wide Web: Usually referred to simply as the Web. This is the most powerful and fastest growing Internet service. The World Wide Web was the brainchild of Tim Berners-Lee, who in 1989 invented the HTML coding language that is the basis of the Web. The Web became a public service in 1993. It is a huge collection of resources of information, including learning materials, which is accessed by means of a computer program known as a Browser. The World Wide Web is only part of the Internet, but many people treat both terms as synonyms. See Module 1.5, Introduction to the Internet, Module 2.3, Exploiting World Wide Web resources online and offline, Module 3.3, Creating a World Wide Web site. See also Web 2.0.

Worm: A computer worm is a self-replicating hostile computer program, similar to a computer Virus. A virus attaches itself to and becomes part of another program, but a worm is self-contained and does not need to be part of another program to propagate itself. Worms can cause considerable damage to computers. See Trojan.

Write Protect: To protect a Storage Device, File or Folder so that its contents cannot normally by altered or erased. This may be done physically, e.g. by moving a notch on a floppy disk's casing, or - more commonyl these days - through software that designates the device, file or folder as read-only.

WWW: Abbreviation for World Wide Web.

X

XML: Abbreviation for eXtensible Markup Language. XML is a specification emanating from the World Wide Web Consortium (W3C) that allows Web designers to create their own language for displaying documents on the Web. XML is an extension to the standard language for creating Web pages, HTML, and makes it possible to create websites containing more complex interactivity.

Y

YouTube: A website to which you can upload your own video clips and view video clips uploaded by others: http://www.youtube.com. See Section 2.2.3.6, Module 2.2, headed Saving and converting streaming media for use offline.

Z

Zip Disk: A portable type of disk used to store around 100Mb of data. Zip disks have become obsolete since the arrival of smaller and more convenient storage devices with much greater storage capacity, e.g. the increasingly popular Flash Drive or Memory Stick. See Storage Device.

Zip Drive: A type of disk drive that accepts portable zip disks (see above). Zip drives themselves are also portable and can be connected to almost any computer. See Zip Disk.

Zip: Used as a verb to describe the process of compacting files or programs in order to cut down the amount of storage space they require by compressing them into one tightly-packed file and thus to make it easier for them to be transported on floppy disks or transmitted electronically to other locations, e.g. via the Internet. Proprietary programs, such as WinZip or WinRar, can be used to zip data and files. Zipped files are recognized by the Extension .zip or .rar (for files created with WinRar) and have to be unzipped before they can be used, again using proprietary programs.

APPENDIX B: ISTE NETS STANDARDS

STUDENTS

National Educational Technology Standards (NET – S) and Performance Indicators for Students

1. **Creativity and Innovation.** Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. Students:
    a. Apply existing knowledge to generate new ideas, products and processes
    b. Create original works as a means of personal or group expressions
    c. Use models and simulation to explore complex systems and issues
    d. Identity trends and forecast possibilities
2. **Communications and Collaboration**. Students use digital media and environments to communicate and work collaboratively, including at a distance to support individual learning and contribute to the learning of others. Students:
    a. Interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media
    b. Communicate information and ideas effectively to multiple audiences using a variety of media and formats
    c. Develop cultural understanding and global awareness by engaging with learners of other cultures
    d. Contribute to project teams to produce original works or solve problems
3. **Research and Information Fluency.** Students apply digital tools to gather, evaluate, and use information. Students:
    a. Plan strategies to guide inquiry
    b. Locate, organize, analysis, evaluate, synthesize, and ethically use information from a variety of sources and media
    c. Evaluate and select information sources and digital tools based on the appropriateness to specific tasks
    d. Process data and report results
4. **Critical Thinking, Problem Solving, and Decision Making.** Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decision using appropriate digital tools and resources. Students:
    a. Identify and define authentic problems and significant questions for investigation
    b. Plan and manage activities to develop a solution or complete a project
    c. Collect and analyze data to identify solutions and/or make informed decisions
    d. Use multiple processes and diverse perspectives to explore alternative solutions
5. **Digital Citizenship.** Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. Students:
    a. Advocate and practice safe, legal, and responsible use of information and technology
    b. Exhibit a positive attitude toward using technology that supports collaboration, learning and productivity
    c. Demonstrate personal responsibility for lifelong learning
    d. Exhibit leadership for digital citizenship
6. **Technology Operations and Concepts.** Students demonstrate a sound understanding of technology concepts, systems, and operations. Students:
    a. Understand and use technology systems
    b. Select and use applications effectively and productively
    c. Troubleshoot systems and applications
    d. Transfer current knowledge to learning of new technologies

TEACHERS

National Educational Technology Standards (NET – T) and Performance Indicators for Teachers

1. **Facilitate and Inspire Student Learning and Creativity.** Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experience that advance student learning, creativity, and innovation in both face-to-face and virtual environments. Teachers:
    a. Promote, support, and model creative and innovative thinking and inventiveness.
    b. Engage students in exploring real-world issues and solving authentic problems using digital tools and resources
    c. Promote student reflection using collaborative tools to reveal and clarify students' conceptual understanding and thinking, planning, and environments
    d. Model collaborative knowledge construction by engaging in learning with students, colleagues, and other in face-to-face and virtual environments
2. **Design and Develop Digital-Age Learning Experience and Assessments.** Teachers design, develop, and evaluate authentic learning experience and assessments incorporating contemporary tools and resources to maximize content learning in context and to develop the knowledge, skills, and attitudes identified in the NETS-S. Teachers:
    a. Design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity
    b. Develop technology-enriched learning environments that enable all students to pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning and assessing their own progress
    c. Customize and personalize learning activities to address students' diverse learning styles, working strategies and abilities using digital tools and resources
    d. Provide students with multiple and varied formative and summative assessments aligned with content and technology standards and use resulting data to inform learning and teaching
3. **Model Digital-Age Work and Learning.** Teachers exhibit knowledge, skills, and work processes representative of an innovative professional in a global and digital society. Teachers:
    a. Demonstrate fluency in technology systems and the transfer of current knowledge to new technologies and situations
    b. Collaborate with students, peers, parents, and community members using digital tools and resources to support student success and innovation
    c. Communicate relevant information and ideas effectively to students, parents, and peers using a variety of digital-age media and formats
    d. Model and facilitate effective us of current and emerging digital tools to locate, analyze, evaluate, and use information resources to support research and learning
4. **Promote and Model Digital Citizenship and Responsibility**. Teachers understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their profession practices. Teachers:
    a. Advocate, model, and teach safe, legal, and ethical use of digital information and technology, including respect for copyright, intellectual property, and the appropriate documentation of sources
    b. Address the diverse needs of all learners by using learning-centered strategies and providing equitable access to appropriate digital tools and resources
    c. Promote and model digital etiquette and responsible social interactions related to the use of technology and information
    d. Develop and model cultural understanding and global awareness by engaging with colleagues and students of other cultures using digital-age communication and collaboration tools
5. **Engage in Professional Growth and Leadership.** Teachers continuously improve their professional practice, model lifelong learning, and exhibit leadership in their school and professional community by promoting and demonstrating the effective use of digital tools and resources. Teachers:

a. Participate in local and global learning communities to explore creative applications of technology to improve student learning
b. Exhibit leadership by demonstrating a vision of technology infusion, participating in shared decision making and community building, and developing the leadership and technology skills of others
c. Evaluate and reflect on current research and professional practice on a regular basis to make effective use of existing and emerging digital tools and resources in support of student learning
d. Contribute to the effectiveness, vitality, and self-renewal of the teaching professions of their school and community

ADMINISTRATORS/PRINCIPALS

ISTE National Educational Technology Standards (NETS-A) and Performance Indicators for Administrators

1. **Visionary Leadership**. Educational Administrators inspire and lead development and implementation of a shared vision for comprehensive integration of technology to promote excellence and support transformation throughout the organization. Education Administrators:
    a. Inspire and facilitate among all stakeholders a shared vision of purposeful change that maximizes use of digital-age resources to meet and exceed learning goals, support effective instructional practice, and maximize performance of district and school leaders.
    b. Engage in an ongoing process to develop, implement, and communicate technology-infused strategic plans aligned with a shared vision.
    c. Advocate on local, state, and national levels for policies, programs and funding to support implementation of a technology infused vision and strategic plan.
2. **Digital-Age Learning Culture**. Educational Administrators create, promote, and sustain a dynamic, digital-age learning culture that provides a rigorous, relevant, and engaging education for all students. Educational Administrators:
    a. Ensure instructional innovation focused on continuous improvement of digital-age learning
    b. Model and promote the frequent and effective use of technology for learning
    c. Provide learner-centered environments equipped with technology and learning resources to meet the individual, diverse needs of all learners
    d. Ensure effective practice in the study of technology and its infusion across the curriculum
    e. Promote and participate in local, national, and global learning communities that stimulate innovation, creativity, and digital-age collaboration
3. **Excellence in Professional Practice**. Educational Administrators promote an environment of professional learning and innovation that empowers educators to enhance student learning through the infusion of contemporary technologies and digital resources. Educational Administrators.
    a. Allocate time, resources, and access to ensure ongoing professional growth in technology fluency and integration
    b. Facilitate and participate in learning communities that stimulate, nurture, and support administrators, faculty, and staff in the study and use of technology
    c. Promote and model effective communication and collaboration among stakeholders using digital-age tools
    d. Stay abreast of educational research and emerging trends regarding effective use of technology and encourage evaluation of new technologies for their potential to improve student learning
4. **Systematic Improvement.** Educational Administrators provide digital-age leadership and management to continuously improve the organization through the effective use of information and technology resources. Educational Administrators:
    a. Lead purposeful change to maximize the achievement of learning goals through eh appropriate use of technology and media-rich resources
    b. Collaborate to establish metrics, collect and analyze data, interpret results, and share findings to improve staff performance and student learning

c. Recruit and retain highly competent partnerships to support systemic improvement
d. Establish and leverage strategic partnerships to support systemic improvement
e. Establish and maintain a robust infrastructure for technology including integrated, interoperable technology systems to support management, operations, teaching and learning

5. **Digital Citizenship**. Educational Administrators model and facilitate understanding of social, ethical, and legal issues and responsibilities related to an evolving digital culture. Education Administrators:
    a. Ensure equitable access to appropriate digital tools and resources to meet the needs of all learners
    b. Promote, model, and establish policies for safe, legal, and ethical use of digital information and technology
    c. Promote and model responsible social interactions related to the use of technology and information
    d. Model and facilitate the development of a shared cultural understanding and involvement in global issues through the use of contemporary communications and collaboration tools

APPENDIX C: FSM TECHNOLOGY STANDARDS PROFILES BY GRADE CLUSTERS

National Educational Technology Standards (NET – S) Profiles for Technology (ICT) Literate Students Grades PK-2 (Ages 4-8)

The following experiences with technology and digital resources are examples of learning activities in which students might engage during PK-Grade 2 (Ages 4-8):

1. Illustrate and communicate original ideas and stories using digital tools and media-rich resources (1,2)
2. Identify, research, and collect data on an environmental issue using digital resources and propose a developmentally appropriate solution. (1,3,4)
3. Engage in learning activities with learners from multiple cultures through e-mail and other electronic means. (2,6)
4. In a collaborative work group, use a variety of technologies to produce a digital presentation or product in a curriculum area. (1,2,6)
5. Find and evaluate information related to a current historical person or event using digital resources. (3)
6. Use simulations and graphical organizers to explore and depict patterns of growth such as the life cycles of plants and animals. (1,3,4)
7. Demonstrate the safe and cooperative use of technology. (5)
8. Independently apply digital tools and resources to address a variety of tasks and problems. (4,6)
9. Communicate about technology using developmental appropriate and accurate technology. (6)
10. Demonstrate the ability to navigate in virtual environments such as electronic books, simulation software and web sites. (6)

(Numbers in parentheses identify the NET – S standard)

1. Creativity and Innovation.
2. Communications and Collaboration.
3. Research and Information Fluency.
4. Critical Thinking, Problem Solving, and Decision Making.
5. Digital Citizenship.
6. Technology Operations and Concepts.

National Educational Technology Standards (NET – S) Profiles for Technology (ICT) Literate Students Grades 3-5 (Ages 8-11)

The following experiences with technology and digital resources are examples of learning activities in which students might engage during Grades 3-5 (Ages 8-11):

1. Produce a media-rich digital story about a significant local event based on first-person interviews. (1,2,3,4)
2. Use digital-imaging technology to modify or create works of art for use in a digital presentation. (1,2,6)
3. Recognize bias in digital resources while researching an environmental issue with guidance from the teacher. (3,4)
4. Select and apply digital tools to collect, organize, and analyze data to evaluate theories or test hypotheses. (3,4,6)
5. Identify and investigate a global issue and generate possible solutions using digital tools and resources. (3,4)

6. Conduct science experiments using digital instruments and measurement devices. (4,6)
7. Conceptualize, guide, and manage individual or group learning projects using digital planning tools with teacher support. (4,6)
8. Practice injury prevention by applying a variety of ergonomic strategies when using technology. (5)
9. Debate the affect of existing and emerging technologies on individuals, society, and the global community. (5,6)
10. Apply previous knowledge of digital technology operations to analyze and solve current hardware and software problems. (4,6)

(Numbers in parentheses identify the NET – S standard)
7. Creativity and Innovation.
8. Communications and Collaboration.
9. Research and Information Fluency.
10. Critical Thinking, Problem Solving, and Decision Making.
11. Digital Citizenship.
12. Technology Operations and Concepts.

National Educational Technology Standards (NET – S) Profiles for Technology (ICT) Literate Students Grades 6-8 (Ages 11-14)
The following experiences with technology and digital resources are examples of learning activities in which students might engage during Grades 6-8 (Ages 11-14):
1. Describe and illustrate a content-related concept or process using a model, simulation, or concept-mapping software. (1,2)
2. Create original animations or video documenting school, community, or local events. (1,2,6)
3. Gather data, examine patterns, and apply information for decision-making using digital tools and resources. (1,4)
4. Participate in a cooperative learning project in an online leering community. (2)
5. Evaluate digital resources to determine the credibility of the author and publisher and the timeliness and accuracy of the content. (3)
6. Employ data-collection technology such as probes, handheld devices, and geographic mapping systems to gather view, analyze, and report results for content-related problems. (3,4,6)
7. Select and use the appropriate tools and digital resources to accomplish a variety of tasks and to solve problems. (3,4,6)
8. Use collaborative electronic authoring tools to explore common curriculum content from multicultural perspectives with other learning. (2,3,4,5)
9. Integrate a variety of file types to create and illustrate a document or presentation. (1,6)
10. Independently develop and apply strategies for identifying and solving routine hardware and software problems. (4,6)

(Numbers in parentheses identify the NET – S standard)
1. Creativity and Innovation.
2. Communications and Collaboration.
3. Research and Information Fluency.
4. Critical Thinking, Problem Solving, and Decision Making.
5. Digital Citizenship.
6. Technology Operations and Concepts.

National Educational Technology Standards (NET – S) Profiles for Technology (ICT) Literate Students Grades 9-12 (Ages 14-18)

The following experiences with technology and digital resources are examples of learning activities in which students might engage during Grades 9-12 (Ages 14-18):

1. Design, develop, and test a digital learning game to demonstrate knowledge and skills related to curriculum content. (1,4)
2. Create and publish an online art gallery with examples and commentary that demonstrate an understanding of different historical periods, cultures, and countries. (1,2)
3. Select digital tools or resources to use for a real-world task and justify the selection based on their efficiency and effectiveness. (3,6)
4. Employ curriculum-specific simulations to practice critical-thinking processes. (1,4)
5. Identify a complex global issue; develop a systemic plan of investigation, and present innovative sustainable solutions. (1,2,3,4)
6. Analyze the capabilities and limitations of current and emerging technology resources and access their potential to address personal, social, lifelong learning, and career needs. (4,5,6)
7. Design a Web site that meets accessibility requirements. (1,5)
8. Model legal and ethical behaviors when using information and technology by properly selecting, acquiring and citing resources. (3,5)
9. Create media-rich presentations for other students on the appropriate and ethical use of digital tools and resources. (1,5)
10. Configure and troubleshoot hardware, software, and network systems to optimize their use for learning and productivity. (4,6)

(Numbers in parentheses identify the NET – S standard)

1. Creativity and Innovation.
2. Communications and Collaboration.
3. Research and Information Fluency.
4. Critical Thinking, Problem Solving, and Decision Making.
5. Digital Citizenship.
6. Technology Operations and Concepts.

APPENDIX D: TRAINING PLANS

TEACHERS

Background

Teacher ICT training is directed around the NETS Standards for Teachers to allow teachers to create ICT supported environments that contribute to improved student learning. Critical issues include use of ICT for improved assessment; communications with students, parents and the community; and increased productivity.

Modes of training

ICT training of teachers must use a wide variety of strategies. Included are direct of teachers in ICT, self training (can be group) via the Internet or other ICT media, and monitoring and evaluation at classroom, school, state and national levels.

Training area	Training Format	Duration	Description	Comments
Preliminary	School based face to face	2 days	Teachers introduced to NETS standards for students, teachers and administrators/principals ▪ Teachers aware of how the student and teachers standards impact learning and 21st century skills and teaching and learning ▪ Understanding roles of parents, community and private and public partnerships in ICT in education ▪ Training in basic operations, functions and activities ▪ Setting clear goals and objectives using ICT and NETS standards	NETS standards for teachers and students plus performance indicators for students
Level 2	School based face to face	1 week per school	Teacher proficiency developed ▪ More advanced training with real classroom environments and practice involved in training Lesson planning aligned to NETS ▪ Development of learning plans using ICT including ○ Clear student learning outcomes identified ○ Determination of appropriate ICT assessment tools ○ Identification of resource materials Teacher support and monitoring network ▪ Teacher learning groups developed within and across schools ▪ Identification of online support sources ▪ Monitoring and evaluation techniques	

Training area	Training Format	Duration	Description	Comments
			○ Tracking student progress against NETS standards and 21st century skills ▪ Formative assessment ▪ Summative assessment ○ Documentation & record keeping ▪ Communications strategies for students, parents and community ▪ Basics of ICT maintenance and repair all teachers ▪ Internet search skills for education materials	
Level 3	Online (self and group) self help	Ongoing	School based online and self help training ▪ Teachers share ideas, and experience and identify problems and issues ▪ With assistance of administrators, teachers identify self paced individual or group online learning opportunities ▪ Document center for lesson plans, resources materials and assessment tools and approaches state and/or national based	
Level 4	Face to face		Advanced ICT maintenance and repair for selected teachers and staff	
Level 5	Face to face, self help and online		Identification of trainers at schools sites and in geographical areas of each state as resource and training personnel for ICT design, research and implementation	
Teacher Education Programs	COM-FSM teacher education		Incorporate NETS Standards for Students, Teachers and Administrators/Principals into college curriculum and program and course level program learning outcomes	

ADMINISTRATORS/PRINCIPALS

Training area	Training Format	Duration	Description	Comments
Preliminary	Face to face	3 - 5 days	Principals & Administrators introduced to NETS Standards for Students, Teachers & Administrators/Principals ▪ Administrators/principals aware of how the student and teachers standards impact learning and 21st century skills and teaching and	

			learning ▪ Understanding roles of parents, community and private and public partnerships in ICT in education ▪ Training in basic operations, functions and activities ▪ Setting clear goals and objectives using ICT and NETS standards ▪ Basics of computer and software operations	
Level 1			▪ Administrators/principals acquainted with principles, potential impact and challenges of ICT implementation including ADB Good Practices in ICT in Education and case studies of ICT implementation from the ADB, World Bank, OLPC and UNESCO ▪ Improving administrative effectiveness and efficiency ▪ Understanding how to determine and evaluate total costs of ICT programs and projects (equipment costs, replacement costs, training and retraining, maintenance and repair, Internet access, monitoring & evaluation, etc.) ▪ Monitoring and evaluation ▪ Risk assessment and mitigation strategies ▪ Basic maintenance and repair skills ▪ Computer and service skills training ▪ ICT leadership skills including ICT based assessment and communications strategies including social networking and cooperative and collaborative tools ▪ Internet search skills for education materials ▪ Management of ICT programs and projects	
Level 2			▪ Retraining and upgrading of skills ▪ Focus on specific areas for in-depth training	

PARENTS

Training area	Training Format	Duration	Description	Comments
Overview	Face to face	1 days	Parents are introduced to NETS Standards for Students, Teachers & Administrators/Principals ▪ Parents aware of how the student and teachers standards impact learning and 21st century skills and	

			teaching and learning ▪ Understanding roles of schools, parents, community and private and public partnerships in ICT in education ▪ Understanding goals and objectives of using ICT and NETS standards in education in the FSM ▪ Basics of computer and software operations	

APPENDIX E: IMPROVEMENT & ASSESSMENT PLANS & ASSESSMENT REPORTS

Recommended Improvement and Assessment Plan Format

Unit/Program Link to FSM Technology Plan K – 12 Goals:
▪ Learning ▪ Assessment ▪ Teaching ▪ Productivity
Unit/Program Outcomes/Objectives:
1. SMART (Specific, Measurable, Achievable, Realistic, Timebound, Extending, Reviewed) outcome/objective a. Strategies/action steps b. Strategies/action steps 2. SMART (Specific, Measurable, Achievable, Realistic, Timebound, Extending, Reviewed) outcome/objective a. Strategies/action steps b. Strategies/action steps

Evaluation questions	**Data sources**	**Sampling**	**Analysis**
One evaluation question for each outcome/objective			

Timeline

Activity	**Who is Responsible?**	**Date**

Recommended Assessment Report Format

Evaluation Question (Use a different form for each evaluation question):

First Means of Assessment for Evaluation Question Identified Above (from your approved assessment plan:

1a. Means of Unit Assessment & Criteria for Success:
1b. Summary of Assessment Data Collected:
1c: Use of Results to Improve Program/Unit Impact/Services[Closing the loop]:

For additional information on the improvement and assessment plans and the assessment report approach and also information on selection of assessment tools, see the COM-FSM Institutional Assessment Plan Handbook at http://www.comfsm.fm/irpo/assessment.html.

APPENDIX F: INVENTORY POLICIES AND PROCEDURES

POLICY

To ensure effective and efficient use of ICT equipment an inventory system will be used to track equipment that meets minimum national and state financial management requirements that includes at a minimum: date of purchase, replacement date, manufacturer, serial number, location, working status (updated), assigned user (s), and if appropriate the operating system model and version, and critical software.

While it will vary from state to state, the inventory system must be updated on a monthly basis and reviewed by relevant staff.

Equipment

General Equipment Policies

Instructional equipment shall be used for the primary purpose of providing instruction and educational experiences to currently enrolled students in bona fide courses for academic assignments and/or engaged in supplemental exercises deemed necessary and appropriate by the responsible instructor.

Guidelines for granting equipment use outside of instructional purposes

1. Such use does not interfere with regular, normal course instruction or with supplemental exercises associated with such courses.
2. Equipment is not used for personal, political, or commercial enterprises.
3. Use will not disrupt any School programs
4. Use will not create or increase risk of liability
5. Use of equipment will have a minimal impact on cost resources (electricity cost, expendable materials, increased chance of loss of equipment, and so forth).
6. User must be determined to be qualified to use the equipment requested in a safe and reliable manner.

Computer Technologies Specific Policies

Computing resource equipment purchased by the DOE's or under the auspices of the DOE's is owned by the respective DOE. Equipment does not "belong" to the person whose desk on which the equipment is located. Computers purchased out of departmental budgets will not be removed from that department or division without consent of the department or division head, with the proviso that the Technical Committee or Administrative head can overrule a department or division chair's objection to the removal of said equipment.
Computer servers should not be used as a workstations except by the administrator for purposes of server administration or in exceptional situations. If possible, servers should be in a securable area or building. Ideally, servers should be located in physically secure areas such as a locked closet. If possible, cables to servers and their connections should be in a secure location.

Persons moving computer equipment are liable for any damage that occurs as a result of negligence in the moving process.
Computers must be protected by, at minimum, a surge suppressor. The preferred power protection equipment is a line-leveling battery back-up unit with surge suppression capabilities. The unit should be able to output the appropriate voltage without relying on the battery in situations such as mild brown-outs.

All modems must be run through a phone line surge protector

Computer equipment and peripherals must be kept in an environment which is secure from theft.

Computer equipment and peripherals must be secure from physical damage. Special care and consideration should be given to prevent damage due to liquids and moisture.

Whenever possible, computer equipment must be placed in an air-conditioned environment. The salt and humidity factors in Micronesia create corrosive conditions.

All computers must have anti-virus programs installed with up-to-date virus monitoring definitions. (Note: free antivirus programs can be downloaded and updated from the Internet)

Portable Computer Equipment

Portable computers purchased by the DOE's remain the sole property of the DOE's.

Where available, portable computers and portable peripherals such as digital cameras can be checked out for usage at home. Computers and peripherals must come back to the designated area the next working day.

Written authorization to utilize a portable computer off-campus is required. The authorization will require acceptance of responsibility for the equipment.

All employees who are taking vacation leave must check-in any portable equipment that they use with their supervisor

The portable computer power supply must be protected, at minimum, by a surge protector wherever the computer is used.

The portable computer and associated peripherals must be kept in a secure and appropriate environment.

The computer must be secure from theft.

The computer must be secure from physical damage. Special care and consideration should be given to prevent damage due to liquids and moisture.

Portable computers must have terminate and stay resident anti-virus monitoring software.

During long breaks, portable equipment must be stored in a physically and environmentally secure location on campus.

Software Specific Regulations

Where applicable, all games are to be removed from all computers, with the exception of games sanctioned by the DOE's for instructional purposes. Games are generally defined as use of the computers in such a manner as to not lead toward an end result of significant educational, intellectual, or academic value.

Programs which encourage critical thinking skills, cooperative learning, group work, work related skills, or academic capacities are permitted.

All software purchased for computers, computer laboratories and other uses must be approved by the Technical Committee PRIOR to its purchase.

Technology Standardization

IT Standardization is a strategy for minimizing IT costs within an organization by keeping hardware and software as consistent as possible and reducing the number of tools you have that address the same basic need. It may take the form of ensuring that every computer has the same operating system, or of purchasing hardware in bulk so that every PC in your office is the same make and model. Standardization often goes hand in hand with centralization, the process of giving your IT department more control over purchases of hardware and software, and more control over what staff members are allowed to do with their office computers.

While imposing equipment standards can help you streamline your IT infrastructure, simplify decision-making, and minimize purchasing and maintenance costs, the process of standardizing itself can be complicated. Below, we'll show you ways to gauge the level of standardization your organization requires, highlight some of the benefits of standardization, and offer tips for standardizing your equipment while balancing organizational and staff needs.

The Benefits of Standardization

Hardware and software aren't the only aspects of an IT system that you might consider streamlining. Below, we've highlighted some of the advantages of standardizing everything from your operating system to your vendor relationships.

Hardware.

Computer manufacturers change their models almost daily in response to fluctuations in price and the availability of new components from their suppliers. This can cause problems for IT departments, who often want to support a minimum number of hardware configurations. By using three or four standard hardware combinations in your nonprofit, IT staff has a chance to get comfortable and knowledgeable with these systems, allowing them to diagnose and fix problems more quickly and easily. With 10 hardware configurations, on the other hand, it may take much longer to achieve that level of comfort and fluency. Another advantage to standardizing hardware is that some hardware components are incompatible with other pieces or hardware or software. The fewer different pieces of hardware you support, the less frequently you'll encounter this problem.

Operating Systems.

It's hard for techies to stay on top of new releases, updates, and information when they're supporting more than one operating system. Moreover, because each operating system supports different software, you may end up supporting two versions of every piece of software, or different pieces of software that serve the same purpose, if you fail to impose a standard operating system at your organization.

Software.

Some users feel comfortable with their ancient, serviceable software, while others will always clamor for the latest applications and features. However, you can save a lot of time and hassle when your entire organization uses the same version of the same software. Not only does this make it easier to install security patches and upgrades automatically, it also makes it much easier to test new programs and upgrades for conflicts. If your organization plans to upgrade Windows operating system for example, the IT department has to look at every major piece of software in the organization to make sure it works with the new operating system. More software equals more chances for software conflicts. Sometimes you can allow for some customization by allowing staff to choose software off an approved list. This reduces the number of supported applications without eliminating choice altogether. This will also discourage staff from clinging to old, outdated software.

Vendor Relationships.

Dealing with too many vendors can be confusing from a billing, tech support, and interpersonal perspective. You may be able to reduce the number of vendors you work with by purchasing your printers and servers from the same company that sells you desktop PCs. Technology resellers businesses that buy equipment on your behalf —

can also often be a good place to purchase hardware and software from different manufacturers from one central point of contact, simplifying the purchasing process.

Miscellaneous.

Servers, printers, scanners, copiers, and other pieces of hardware are cheaper and easier to support if you're buying in bulk from the same vendor. However, only large organizations buy these items frequently enough to make bulk purchases. On the other hand, since successive models from the same manufacturer often have a lot in common, even small organizations can build on their existing skills by staying with the same company over time.

Tips for Standardizing Your Equipment

If you work in an office with multiple models and versions of software and equipment, the task of standardizing everything can be overwhelming. Starting from scratch by buying all new equipment is probably not an option for most (if any) organizations, but there are a few steps you can take to standardize your equipment over time.

Buy in quantity.

Computer companies change their models constantly, meaning that the computer you buy this week may be different from the one you bought last week, even if the model number is exactly the same. It may have a different network card, a different hard drive, or even a different motherboard. If you space your purchases out over the year, each batch of machines will be a little different from the others. You can mitigate this somewhat by working with your sales representative and buying business-class computers (see below), but it's still worth it to consolidate your purchases.

Buy business-class computers.

When you're buying new computers, consider business over home models. Manufacturers change the components in their business machines much less frequently, and they often will guarantee configuration support for a certain period of time (usually six months).

Plan ahead.

If you speak with a broad cross-section of your colleagues and supervisors when you're planning your budget for the year, you'll know roughly how many new computers you'll need and what other types of technology you'll be buying, making it easier to standardize your equipment.

Make technology inventories and track your assets.

If you know how many computers you have and how old they are, you'll know roughly how many you need to replace in the upcoming year. Also, you can identify the one-off, non-standard pieces of hardware and software in your organization and then get rid of them as soon as possible.

Make purchases centrally.

Although all staff should have some input into your purchasing plans, don't let every department do its own buying unless they're buying off of a predefined list of approved items. Individual purchasing can not only lead to hardware and software incompatibility, but it can also cause confusion on the accounting side as you try to sort through and reconcile bills from multiple vendors.

Accept donations selectively.

If you accept every hardware donation that shows up on your doorstep, you'll eventually have an unmanageable patchwork of computing equipment. One way to prevent this is to create a written policy specifying which

donations you will and won't accept. This policy can help you politely decline gifts that don't fit with the mission and technology plan of your organization, and direct unwanted donations to qualified computer refurbishers.
As we mentioned above, your policies should reflect your decisions with regard to centralization and standardization. A simple policy entitled "Supported Hardware and Software" is a good start, but your IT Purchasing Policy, and your Computer Acceptable Use Policy should also reflect your approach to these questions.

Balancing IT Needs and Staff Needs

If your organization has traditionally allowed departments to choose and customize their own equipment, it can be difficult to convince employees to switch to a more centralized, standardization-friendly IT purchasing system. Yet there are ways to streamline your purchasing procedures without ignoring staff needs.

Involve front-line staff in the technology planning process and purchasing decisions.

Representatives from each department can be a part of the team that writes your organization's tech plan; if staff members don't have time to participate directly, you can interview them about their technology priorities and concerns. If you're making a major purchasing decision, be sure to ask staff from various departments to weigh in on the packages offered by various vendors.

Consider offering staff a choice between two computer models.

Organizations with sufficient IT resources may be able to support more than one computer. For example, staff who need to use graphics programs and other resource-hungry software could receive a more sophisticated model, while others could receive a less expensive option.

Many organizations have a list of "preference" software that employees can request from the IT department. These applications are supported, but not installed by default on every machine. This model gives employees access to specialized software, but IT isn't supporting three different types of photo editing software, for example.

APPENDIX G: HARDWARE & SOFTWARE RECOMMENDATIONS & PURCHASE PLANS

POLICY HARDWARE & SOFTWARE RECOMMENDATIONS & PURCHASE PLANS

ICT purchases must be support by a plan that provides impact on learning for students and teachers, assessment or increased productivity and have an M & E component as addressed in Appendix E. **Priority must be given to increasing impact of ICT on students and teachers. ICT purchases will not be approved unless determination that adequate attention is given to power supply, maintenance, and training are provided for at the work site.**

According to JEMCO, there remain problems in the FSM school systems with data accuracy, consistency of reporting of data, and coding of data. While efforts had been made to assist state in submitting data, states continue to fall behind meeting submission deadline and data consistency. Cooperation between state DOE and National DOE must be strengthened in order to address and improve the current issues pertaining to data consistency and timely submission. Having standard Hardware and Software recommendations used consistently by all DOE's along with purchase plans will help ensure compatibility of said hardware and software to ultimately improve reporting consistency.
All departments operating UNIX type or Windows Server systems are expected to have operators and/or system administrators with a working knowledge of their operating system (OS) as well as familiarity with installed hardware and applications. In addition, local operators or administrators are expected to be familiar with the security implications of operating a multi-user, multitasking OS and to follow security policies and procedures.

UNIX type and Windows Server systems are both general purpose operating systems and therefore are often used to provide a range of network services to other systems. Examples include file and print services, web, ftp, or name service, and email service. Any degradation to any of the aforementioned services can greatly increase the administrative tasks and security implications associated with system maintenance, taking valuable machine and human resources away from the systems primary function.

General

Technology Hardware and Software are considered computing resources. Computing resources include computers, servers, printers, network devices and cabling, and software that is installed or made available by DOE's. Resources also include services provided by the school systems such as network services like e-mail and Internet access.

The computing resources of the DOE's in the FSM are intended to support the academic programs of the school system.

DOE's computing resources may not:

> Be used for commercial purposes including advertising of commercial products or services, direct or indirect profit or gain
>
> Be used in any way which will violate international copyright statutes or regulations.

Computing resources are to be considered as shared, finite resources provided by the DOE's and to promote scholarship and learning for all students, staff, and faculty. Monopolizing this shared resource through deliberate action or inaction is prohibited.

School related work, such as work for classes, committees, and school projects, has first priority. If work is being done that is not school related, another user can ask the person doing the non-school related work to relinquish the computer

Purchase Plans

Purchase orders for computers and computer related equipment must be submitted through a person authorized by the Administration to make technical approvals of purchases such as an IT Coordinator.

The IT Coordinator will determine best recommended computer specifications based on currently available technology, suitability to specified purpose, and compatibility with existing systems. Therefore:

IT Coordinator reserves the right to request information on the purpose of the purchase and information regarding specified equipment

Justification must be submitted with the purchase order stating the need and the purpose of the item
IT Coordinator can decline to approve a purchase with adequate justification. The buyer can appeal such a decision to the Technical Committee.

When you're lacking time and money, it's tempting to wait until a computer breaks or a piece of software becomes obsolete and then think about how you'll replace it.

Actions

- Make technology refresh a part of your strategic planning and technology planning conversations. It can have a major impact on your budget and your services, so you want feedback from techies, frontline staff, the management team, and board members.
- Use IT asset management tool software to help you determine which computers need to be replaced.
- Communicate with staff. Let them know well in advance if you'll be replacing their computers or installing new software. Ask them if the upgrade will have any unforeseen consequences on the way they do their work.
- Train your staff. Rollouts of new software and upgrades of existing software usually require some staff training.
- Avoid the landfill. Finally, be environmentally conscientious when you dispose of old equipment.

In general, desktop systems and servers are replaced every three to four years, while laptops, cell phones and PDAs are swapped every two to three years. Printers and networking equipment may last five years or more. Software and operating systems vary widely, depending on your organization's needs and vendor support. However, these are all just guidelines. Factors unique to your organization will drive the final decision about when to refresh.

- What is your budget? Can you afford to buy new computers or new software?
- How much are your old computers really costing you? "Hang onto those PCs as long as possible! Squeeze every last dime out of those computers!" That sounds reasonable enough to the cost-conscious. However, old computers often have significant hidden costs. Your IT staff will spend much more time supporting a five-year-old computer than a newer machine. Frontline staff will waste time waiting for software to load or find that some programs aren't compatible with their older setup. That can cost productivity and significantly cost you more in lost time in the long run.
- How long are the computers under warranty? You can purchase a three- or four-year warranty for their computers and start to look into replacement machines once the warranty runs out.
- Does the vendor still support the technology? Often, a vendor will no longer support a particular operating system or software. From that point on, it gets harder to keep the software secure and operational.

Selecting a Computer Refresh Strategy

Big: In this approach, you switch out all of the computers in at the same time every third, fourth, or fifth year. This is a risky strategy, since your funding sources could dry up just as you're about to replace everything. Furthermore, this "all at once" approach puts a big strain on your IT staff since they have to deal with a large influx of new equipment every few years. On the other hand, your IT department will always have a standard hardware configuration because all the PCs were purchased at the same time. Also, you might save some money by buying in bulk.

Phased refresh: A lot of organizations swap out a fraction of their computers each year. For example, if they're on a four-year replacement cycle, they'll replace 25 percent of their PCs each year. This makes their budget requests more uniform and spreads out the impact of hardware rollouts.

Modified big: If your financial situation allows it, you can set aside a chunk of money each year for new computers. However, rather than spending it as it's allocated, you can wait and make one big purchase every third or fourth year.

Developing a Training Plan

Software upgrades and rollouts can cause a lot of frustration and lost productivity if staff haven't been trained properly beforehand.

How much money and effort will you invest in your training program? "Training" might consist of a few handouts if your new software only implements minor changes. It could consist of a month-long class with multiple sessions if you're upgrading mission-critical software.

Who conducts the training? You can assign the training to internal staff or outside contractors. Developing an effective curriculum takes a big chunk of time, so occasionally bring someone in from the outside or send their employees to classes held at other locations.

Being thoughtful about how much time and energy you invest in training can help ensure that your staff is up to speed on refreshed software or hardware and that your organization can get on with the real mission-based work that matters.

If you plan for technology replacements and upgrades and discuss your needs with funders, you can minimize the impact of outdated equipment.

Warranties

Manufacturer warrants that the hardware products it manufactures are free from defects in materials and workmanship. Manufacturer will repair or replace products covered under this limited warranty that are returned to the manufacturer's facility. After complying with the manufacturer's procedure in requesting warranty service, NDOE and SDOE's will ship the products back to the manufacturer in their original or equivalent packaging, prepay shipping charges, and insure the shipment or accept the risk of loss or damage during shipment. Manufacturer will ship the repaired or replacement products back freight collect. The manufacturer agrees to provide technical assistance for the duration of the warranty

Manufacturer owns all parts removed from repaired parts removed from repaired products. Manufacturer may use new and reconditioned parts made by various manufacturers in performing warranty repairs and building replacement products. If manufacturer repairs or replaces a product, its warranty term is not extended.

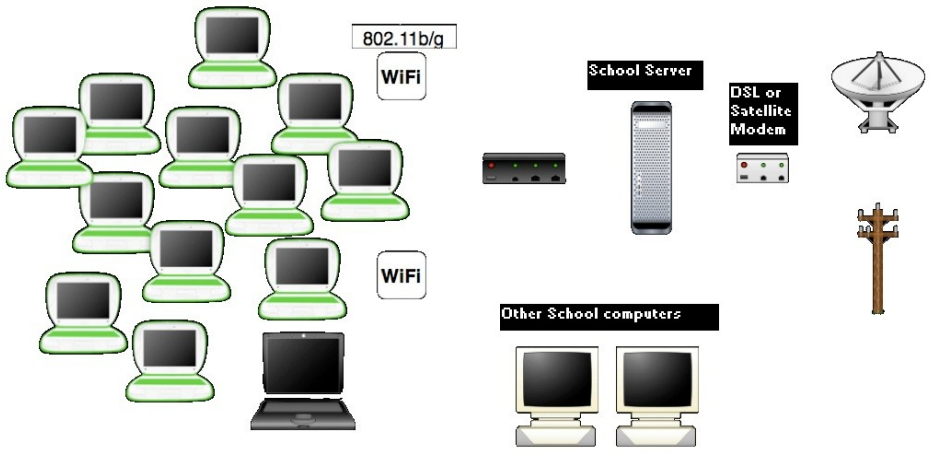
Guarantees

The manufacturer guarantees that its systems are designed and extensively tested to compatible with all standard operating systems, applications, software, peripheral, and network operating systems developed for Industry

Standard Architecture (ISA), Peripheral Component Interconnect (PCI), and Extended Industry Standard Architecture (EISA) systems for a period of two years after the invoice date. The manufacturer guarantees that the manufacturer's engineers and technicians will work with DOE's to identify the cause of the problem and recommend a solution. If the problem (excluding software problems related to device drivers) can be solved by updating the system, the manufacturer will guarantee to provide the DOE's with the change at no charge.

FSM School System Recommendation:

It is recommended that the One Laptop Per Child (OLPC) model be adopted for the FSM school system through out the FSM. The model is to have one laptop per pupil which the child owns and takes home and keeps throughout their school years. The units are connected via WiFi switches at school locations which also house the school server which contains content for these OLPC units to access when connected. The school server is then either a stand alone unit that is loaded manually or is connected to the internet via a DSL link or satellite modem or to locally available connectivity means to the internet to be able to download content and connect to services offered by central Education offices.



APPENDIX H: IT MAINTENANCE & SUPPORT

POLICY IT MAINTENANCE & SUPPORT

The NDOE and SDEs will provide adequate maintenance and support services for ICT including but not limited to adequate staffing, training of ICT staff, teachers and support staff in basic to advanced support of ICT equipment.

Because technology continues to play an important role in modern society, integrating technology into the schools will help prepare students to succeed in a rapidly changing world. Technology is transforming society, and schools do not have a choice as to whether they will incorporate technology but rather how well they use it to enhance learning. To ensure that technology is effectively integrated into the schools, educators and community members must collaborate to create a formal technology maintenance and support plan. Developing a plan for using technology to support education means more than providing for the acquisition of computers and software. To be successful, a technology plan must promote meaningful learning and collaboration, provide for the needed professional development and support, and respond flexibly to change.

Malfunctioning equipment must be surveyed by a Information Technology Coordinator before any action is taken. The following actions, whether by accident or intent, are violations of either the Student Conduct Code or the employment manual:

- Computer system degradation of performance
- Intentional Damage to computer
- Intentional Damage to removable media
- Intentional Damage to CD-ROMs and DVD disks
- Permanent misplacement (loss) of equipment
- Interference with authorized access to resources
-

Changes to hardware and software requires the consent of the local Information Technology Coordinator with guidelines from the Technology Committee.

Failure to adhere to these policies is a violation of student and staff conduct guidelines, and, pending the outcome of proceedings, users may find their access to information system technologies restricted.

Computers that have been removed from service due to failure of one or more critical parts, parts that cannot be replaced, will be used to provide parts to other computers as appropriate. For this reason, computers should be purchased that have as much parts interchangeability as possible.

In general, computer equipment have expected life spans that must be taken into account when budgeting for scheduled replacements. Desktop computers and servers generally last 3 to 4 years, Servers can last longer depending on work load, cell phones and PDAs are swapped every 2 to 3 years, and network switches should be replaced every 3 years. Printers and networking equipment may last 5 years or more.

APPENDIX I: MONITORING & EVALUATION

POLICY FOR MONITORING & EVALUATION

Monitoring and Evaluation (M & E) is a required component for all ICT activities in the FSM Education System. Monitoring will be based on the approved Improvement, assessment plans described in Appendix E. Purchase of new ICT equipment must be supported by an approved assessment report as describe in Appendix E.

APPENDIX J: WEB LINKS & RESOURCES

The following are some web links and resources that may be found useful in implementing ICT into education in the FSM school system. The listing is not intended to be comprehensive, but provide good starting places for information on quality ICT programs in education.

Background Information on the FSM Technology Plan K – 12 and materials referenced in trainings, workshops and the developmental process can be found at the COM-FSM IRPO web site at http://www.comfsm.fm/national/administration/VPA/researchdocs/techPlan/index.html.

International Society for Technology in Education http://www.iste.org/. ISTE NETS Standards for Students, Teachers & Administrators/Principals can be found at this site along with a wealth of support information regarding technology standards and implementing technology in schools and classrooms to support learning.

US Department of Education Technology Plan official site http://www2.ed.gov/about/offices/list/os/technology/plan/2004/site/edlite-default.html.

Asian Development Bank's Good Practice in ICT for Education can be found at http://www.adb.org/documents/guidelines/good-practice-in-ict-for-education/default.asp.

Monitoring and Evaluation of ICT Projects information from the World Bank can be found at http://www.infodev.org/en/publication.9.html.

The Horizon reports track trends in ICT affecting postsecondary and K – 12 education. A new Horizon Report 2010 K -12 can be found at http://www.nmc.org/horizon/.

Thinkfinity 1,000s of free standards based lessons plans http://www.thinkfinity.org/. Content partners include:

Verizon Thinkfinity Content Partners produce the program's nine discipline-specific, standards-based Web sites. Each site includes lessons for teachers, activities to use in and out of the classroom, games for young children and teens, adult literacy resources and reference materials for anyone in the education field, as well as for parents and afterschool practitioners.

ARTSEDGE

Created by the John F. Kennedy Center for the Performing Arts, ARTSEDGE provides resources and examples for teachers to teach in, through and about the arts. The site includes lesson plans, advocacy and professional development resources, and up-to-date information on arts programs from around the world.

EconEdLink

Developed by the Council for Economic Education, EconEdLink provides teachers and students with lessons and classroom learning activities based on economics topics in the news and real-time economics data. EconEdLink content is designed to help integrate economic concepts across the curriculum as outlined in the Voluntary National Content Standards in Economics.

Presented by the National Endowment for the Humanities, EDSITEment features lesson plans and additional classroom resources about art and culture, literature and language arts, foreign language, history and social studies. It also serves as a gateway to the best humanities sites on the Web and features a monthly theme-based teaching resource calendar.

Designed by The National Council of Teachers of Mathematics (NCTM), Illuminations is the comprehensive source for instruction and learning materials based on NCTM's Principles and Standards for School Mathematics. The site makes math engaging, interesting and challenging through interactive applets, standards-based lesson plans and other teacher resources.

Developed by the National Center for Family Literacy (NCFL) and ProLiteracy, Literacy Network provides literacy instructors, tutors, volunteers, librarians and parents with the tools to improve their knowledge and performance and expand their skills in literacy instruction. The site features best practices for lifelong literacy development, valuable professional development opportunities and hundreds of resources that are accessible and easy to use.

Developed by the International Reading Association (IRA) and the National Council of Teachers of English (NCTE), ReadWriteThink provides educators and students with access to the highest quality practices and resources in reading and English language arts instruction. The site features standards-based lesson plans, interactive student materials and a dynamic literacy calendar.

Developed by the American Association for the Advancement of Science, Science NetLinks provides resources for K-12 teachers and students. The site includes lesson plans, interactives, hands-on activities and reviewed resources, all of which provide opportunities to bring science and technology discovery into the classroom. Science NetLinks resources are matched to Project 2061's Benchmarks for Science Literacy.

Designed and developed by the Smithsonian's National Museum of American History, the Smithsonian's History Explorer is a gateway to innovative, standards-based online resources for teaching and learning American history. The site brings history to life through artifacts, primary sources and online tools for the classroom, afterschool activities and home.

Developed by the National Geographic Society, Xpeditions brings rich, standards-based geography content to teachers and students. The site includes materials for K-12 teachers and students and their families, including an interactive atlas with more than 1,600 printable maps and Xpedition Hall–a virtual learning museum with exhibits aligned to the U.S. National Geography Standards.

CNET download site for free and reduced price software http://download.cnet.com/windows/?tag=hdr;snav.