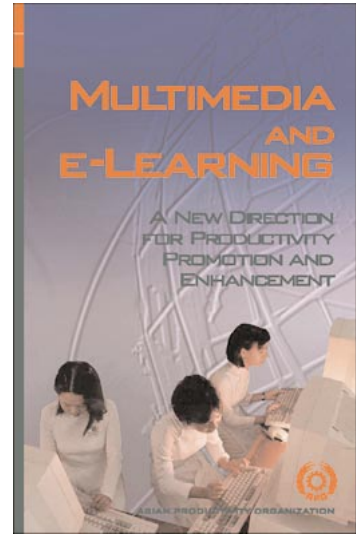From:
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Republic of China, 25–29 March 2002

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Multimedia and e-Learning

A New Direction for Productivity Promotion and Enhancement

Multimedia and e-Learning

A New Direction for Productivity Promotion and Enhancement

FOREWORD

Advances in information and communications technologies have given rise to the multimedia and online phenomena that hold great promise for productivity promotion and enhancement, information dissemination, distance education, and other applications. These two tools are now recognized as not just an "add-on" but a core element of organizational knowledge and effectiveness. As a country's telecommunications infrastructure improves and expands, as the personal computer becomes affordable and easily available, and as the Internet becomes more accessible, multimedia and online technologies will make it possible for information and knowledge to be accessed by people everywhere, even those living in remote areas. Despite this, their potential has yet to be fully appreciated by many.

At this moment, in most APO member countries, the dissemination of information on productivity and ways to enhance it is still very much confined to the large cities. This limits the impact of a country's productivity drive. Now, with the multimedia and online technologies at our disposal, the boundaries of the productivity movement as well as that of skill training and basic literacy and numeracy education within a country could be expanded to involve the participation of people, institutions, and industries even in far-flung places.

To provide insight into the application of multimedia and online technologies in productivity promotion, information dissemination, and training and learning, the APO organized the seminar on "Multimedia for Productivity Promotion and Enhancement with Special Focus on e-Learning" in the Republic of China, 25-29 March 2002. This publication is a compendium of the resource papers and selected country reports presented at the meeting. It is a useful reference text for all those who are involved in productivity promotion or e-learning as administrators, providers, or end-users.

I would like to thank the Government of the Republic of China for hosting the seminar; the China Productivity Center for implementing the program; the resource persons for their valuable contributions; and Mr. Graeme Dobbs for editing the publication.

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TAKASHI TAJIMA
Secretary-General
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Tokyo
March 2003

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1. THE BUSINESS OF E-LEARNING

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Introduction

In 1831 Michael Faraday built a small generator that produced electricity, but a generation passed before an industrial version was built, then another generation before all the necessary additions for electrification came into place (power companies, wiring, appliances, etc). But when that infrastructure finally took hold, everything changed- homes, workplaces, transportation, entertainment, architecture. Electricity became a transformative medium for social change."

From: Growing Up Digital, John Seely Brown

It is increasingly obvious that information and communication technologies are following a similar path. We are past the "prototype" phase and well into the phase where a significant "infrastructure" of communication links, hardware, and software is becoming a "transformative medium for social change."

This change is affecting all aspects of our lives, particularly the workplace. Information and communication technologies have become a key tool for productivity improvement within business and industry. Inevitably, these developments must also impact on the way in which organizations such as national productivity organizations (NPOs) do their work. This impact will include new workflow and management systems within organizations as well as the use of new and emerging technologies for productivity promotion and enhancement.

The objective of the APO seminar on "Multimedia for Productivity Promotion and Enhancement" was to examine the online and multimedia technologies that impact (or have the potential to) on the work of the APO and NPOs. In particular, the seminar aimed to give participants an insight into the potential of multimedia for:

- productivity promotion;
- information dissemination; and
- training and learning.

The seminar was planned to have a special focus on e-learning.

The scope of the seminar included

- an overview of multimedia and online technologies;
- an introduction to current developments in the application of multimedia and online technologies in training and education;
- a discussion of the concept, application, and evaluation of e-learning, with particular reference to its potential for productivity promotion and enhancement;
- examples of e-learning based on Taiwanese and Australian experiences;
- an overview of the process for development of multimedia and e-learning products for productivity promotion and enhancement;
- an introduction to links between e-learning and knowledge management;
- an examination of how multimedia and e-learning are impacting NPOs (through the country paper presentations); and
- an examination of how multimedia and e-learning are impacting seminar participants' own professional development.

Multimedia

Multimedia products mix a range of sensory inputs, e.g., sound, graphics, video, animation, and text. In most cases, multimedia

products rely on computer-based operations for delivery. Delivery can be through online systems, and increasingly multimedia products incorporate some form of user interactivity.

Comparison of multimedia formats

Multimedia products are essentially digital files that are manipulated and delivered through some form of computer processing. There is a range of formats for both file storage and digital processing. These formats differ in parameters, which include storage capacity, data formats, data transfer rates, required hardware, and market penetration (see attachment).

Background to the development of multimedia and e-learning

Multimedia and online products have evolved through changes in technology, changes in society, changes in users and learners, and changes in our understanding of the teaching and learning processes.

Changes in technology include:

- high-speed/higher-bandwidth communications;
- widespread adoption of technical standards for communications;
- convergence of communication media;
- increased power of digital processing (MP3, MPEG2, etc.);
- capacity for publishing to multiple media, such as databases/WAP/eXtensible Markup Language (XML); and
- wireless communications.

In addition, the underpinning technologies now provide seamless, efficient, and effective integration of a variety of media.

These changes have led to much greater ease of access to multimedia products and technologies, particularly to increased access opportunities for rural and remote communities. It has also led to a multiplicity of channels for content and the potential for increased technical quality of content through the introduction of technologies such as DVD and HDTV. Technology development has

supported the design and production of multimedia products that are increasingly complex and interactive and potentially provide a dynamic, personalized user experience.

Changes in society include the intrusion of an increasingly global culture into traditional national communities. Parallel to this is the establishment of new cross-national collaborative networks and communities facilitated through new information and communication technologies.

Multimedia products are also becoming common because users are increasingly:

- media (and multimedia) literate (not just text literate);
- used to highly attention-seeking and motivating styles of presentation of information;
- aware of their own particular learning styles;
- used to accessing information quickly and through discovery rather than being fed the information; and
- used to personalized interfaces.

Finally, the emergence of multimedia and online technologies has caused us to examine the processes of learning more closely. The relevance of the techniques of learning design and instructional design have been recognized and pedagogies that enhance more independent, self-paced, and self-motivated learning are being practiced. In particular, the rich traditions of learning design which have underpinned distance education have gradually been recognized as making an important contribution to the use of multimedia and online products in education and training.

Technology and Innovation: What's Next?

Some of the changes that we can expect are relatively easy to predict as the directions are already clear. We can expect increased access to bandwidth and hence the development of products and services dependent on high-speed communication systems. This is likely to include multimedia and online products using complex simulations and computer game-type interactivity. This will extend

to increased use of intelligent systems and artificial intelligence. We can also expect an increased level of personalization of multimedia experiences and online services as the capacity to capture, store, integrate, and process the relevant data develops.

Industrial Productivity, Technology, and the Internet

In spite of a number of setbacks it is quite clear that the Internet is going to be a major platform for increased industrial productivity. It is important that the services associated with promoting and en-hancing increased productivity take advantage of and align them-selves with this development. Business and industry are already investing heavily in Internet and intranet infrastructure to facilitate increased productivity in their core business processes. Associated with this will be a cultural change in the way in which users access and engage with the services traditionally provided by NPOs (trai-ning, promotion, etc.). Users' expectations will increasingly include engaging multimedia products that are easily accessed on demand. As customer-focused providers we need to look toward a future where our products and services meet these expectations. We need to look now at the potential of multimedia and online technologies for productivity promotion and enhancement.

e-Learning

e-Learning is a concept meaning different things to different peo-
ple. In its broadest sense the "e" represents "electronic" and e-
learning is any type of learning that uses the functionality of a
computer for the presentation, distribution, and/or management of
learning. In this sense, traditional computer-based training would
be classified as e-learning. However, with the rapid development of
the World Wide Web, e-learning now includes a host of varieties of
online learning and Web-based training. e-learning has come to
mean education and training accessed via a Web browser. Today
many examples of e-learning use the Internet to provide interactive,
media-rich education and training on demand.

e-Learning products and services embrace a range of features:

-   Online content and resources (sometimes called learning-
    ware) that can range from traditional text, audio, and
    video to media-rich, interactive applications;
-   Communication tools to support synchronous and/or
    asynchronous interaction between the teacher and the
    learner or between learners;
-   Assessment tools;
-   Navigation structures to guide learners;
-   Research opportunities and links to enhance the learning;
    and
-   Annotations to enable the learner to record and conso-
    lidate learning.

Many examples of e-learning are built around proprietary learning
management system applications that include a range of manage-
ment functions:

-   Course management;
-   Course building and online resource development;
-   Learner management and tracking; and
-   Customized interfaces for different users.

Characteristics of e-Learning

Characteristic	
"Any time, any place"	The ubiquity of the Internet means that e-learning can be available at any time and from any location that the learner finds convenient
Ease of use	The prevalence of the Internet, relatively standard ways of working with it, and the development of expertise in information and navigation design have significantly influenced online learning platforms. Within this context the growth of digital literacy means that users are increasingly approaching e-learning without perceiving a new technology barrier
Learner centered, self-paced learning	The learners' experience can be contextualized and customized to suit their own background and learning style. Users can plan and manage their own learning
Nonlinear, constructivist learning	Learning can be unbounded. Learners can choose their own learning pathway and reach out into broader areas of interest
Collaborative learning	Collaborative approaches to learner support and collaborative learning project work are possible
Low administrative overhead	Administration and documentation of registration, participation, and some forms of assessment can be automated. Some learner feedback can be automated

Models of e-Learning

e-Learning has not developed in a vacuum. Many of the models of e-learning currently being delivered largely replicate traditional classroom models. The e-learning tools are used to replace one or more elements of the classroom teacher's role of content provider, interactive help and learning support, and student management/administration. However, the power of computing, the Internet and database technologies are now making it possible to develop other models such as:

- complex immersive learning environments and simulations;
- open-ended, constructivist models; driven by the learners' own needs, interests, and motivations; and
- knowledge management-based systems where learners are able to locate and access resources to resolve particular issues or problems when and where required ("just-in-time" learning).

Drivers of Technology and Innovation in Education and Training

Perhaps the strongest driver of e-learning is the rapid rate of change in the knowledge base associated with much of our working and recreational lives. The terms "knowledge society" and "knowledge economy" are frequently used to describe the results of changes in technology over the past 20 years. The implication of this rate of change is that education and training must become a lifelong process; traditional schooling and university provision cannot possibly meet these lifelong learning demands.

Industry and business have been leading the adoption of e-learning. In the business context, education and training (both on-the-job and off-the-job training) are critically important for ongoing productivity, innovation, and competitiveness. The potential scalability of e-learning has attracted private-sector interest in the broad education and training market. Globalization is providing rapidly expanding markets for education and training, and investors are looking at a

variety of potentially profitable business models. Similar business models are also influencing the provision of publicly funded education and training as governments attempt to increase the effectiveness and efficiency of their systems.It is not only society that is changing. Learners themselves are changing. They are becoming more demanding, increasingly looking for more flexible means of accessing of education and training. They are also expecting more learner-centered approaches than the traditional teacher-driven approach and classroom-based model. Learners are now seeking an experience contextualized to their own situation and customized to their own learning style. In addition, their increasing familiarity with the highly interactive, immersive environments provided by computer games and the high quality of video and audio entertainment delivered by DVD, CD-ROM, broadband, etc. increase expectations of the quality and richness of education and training resources.

The changes in learners and the changes in society were at least in part brought about by the rapid development of information and communication technologies in recent years. These same technology developments are facilitating a transformation in the efficiency of teaching and learning. It is no longer necessary to aggregate students by asking them to attend a particular class at a particular time in a particular location. Technology can achieve this aggregation in real time if required. All learners, either individually or in groups, can be actively involved in the learning process. Technology can provide mechanisms to ensure that the teaching component is not just pitched at the middle level of student ability. It can provide a dynamic personalized experience based on upfront diagnosis of needs and individual preference. Technology can provide detailed monitoring/tracking/reporting and analysis of individual learning activity.

e-Learning:
Changing the Architecture of Education and Training

The shift to online learning has a number of significant consequences. e-learning is generally less dependent on the physical infrastructure of buildings and classrooms but more dependent on hardware, software, networks, and communications infrastructure.

A commitment to e-learning means a commitment to change the allocation of infrastructure funding. As most models of e-learning are essentially resource-based learning models, a significant investment in the development and maintenance of teaching and learning resources is also needed. Teachers must also prepare themselves for a role as facilitators of learning and enhance their classroom-focused professional development and training with the development of skills and expertise in instructional design.

Perhaps most significantly, a new culture of education and training supported by appropriate legal and regulatory frameworks is needed. Key elements of the current education and training paradigm such as set curriculum, curriculum hours, attendance, accreditation requirements, etc. are relevant only to a classroom-based model.

e-Learning: The Second Wave

e-Learning is no longer new. The first wave of e-learning was driven by the innovators and early adopters. As is often the case, they made mistakes but in so doing they established a technological and pedagogical base for e-learning. As the number of innovators and early adopters grew, the concept of e-learning became more widely understood and its potential more widely recognized.

e-Learning is now part of the organizational change strategy of almost every education and training institution. It is increasingly considered as an option by learners. It is no longer a matter of whether we should commit to e-learning. The question is how organizations and individuals can best adopt and adapt e-learning to their needs.

Within organizations we now see high levels of market understanding and growing expertise in the areas of business case development, financial analysis, and solution design. The considerable market segmentation and associated development of collaborative models of service delivery indicate a maturing industry.

Standards and Specifications

As a confirmation of the increasing integration of e-learning into organizational strategy, whole systems of international specifications and standards governing many aspects of e-learning have been, or are being, developed. These specifications and standards impact both the technical and educational aspects of e-learning products and services and also the interoperability of those products and services. As an example, one of the most important international groups working in this area is the IMS Project (http//:www.imsproject.org).

The IMS Project has developed specifications for:

- metadata;
- question and test interoperability;
- content packaging;
- enterprise data exchange; and
- content management, learner information packaging, instructional design, and accessibility for learners with disabilities.

We Aren't Quite There Yet

In spite of the obvious potential of e-learning, it is clear that we have quite a way to go before this potential is realized. The table below lists some of the expectations and issues still to be realized or addressed fully:

Issue	Explanation
e-Learning is cheaper	e-Learning has a significant upfront investment requirement. Its cost-effectiveness relies on being able to amortize this investment over a large number of learners, either simulta-neously or over a significant period of
e-Learning is learner centered	While an advantage in some cases, many learners are not used to man-aging their own learning and are not motivated to learn by themselves. Significant drop-out rates can occur
"Any time, anywhere"	Just-in-time access depends critically on learners' access to appropriate in-frastructure. Most countries are still building their modern communi-cations infrastructure. We are still well short of a point where the tech-nology is readily available and trans-parent to all users
e-Learning is personalized	Most e-learning products still require personalization through some direct human interaction, usually a teacher or learning facilitator
The technology is ahead of the teaching and learning commu-nity. There is likely to be a substantial lag time before the e-learning paradigm becomes universally accepted	

It's Not All Good News

There are some fairly obvious risks associated with the shift to e-learning. The majority of these risks are not unique to e-learning but- are part of the broader issues associated with the impact of technology and globalization.

Risk	Explanation
Technologies for their own sake	There is always a delicate balance between enthusiasm for what is new and the appropriateness of its application. We need to ensure that the issues of educational and economic return on investment are carefully considered in the planning for e-learning
The digital divide	The rapid increase in knowledge and associated developments in information and communication technologies put disadvantaged communities at risk of further disadvantage
Intellectual property rights (IPR) and copyright	Technology has made it possible to infringe IPR and copyright. This may discourage the wide availability of e-learning in some areas (where the owners of the rights consider the potential loss to exceed any advantage) On the other hand, e-commerce applications are making it possible to sell information effectively and efficiently. A broad shift to increased commercialization of information and knowledge will seriously influence the value of public domain mechanisms for access (e.g., libraries)
Quality, accuracy, currency in a "mixed" environment	The Internet is vast, with extensive amounts of both reliable and unreliable information. It facilitates the dissemination both. Education is needed to ensure that learners develop the appropriate knowledge and skills to manage this complexity

Risk	Explanation
Changing balance of public and private/ commercial provision	The shift of more lucrative and cost-efficient provision to the private sector will affect traditional public provision. There is a need for business models that integrate public and private interests
Protecting cultural traditions	Information and communication technologies are facilitating globalization generally. e-Learning will inevitably push forward the globalization of education and training. A generalized global approach to curricula could undermine the role of education in supporting and protecting local cultural traditions

e-Learning is clearly a change agent in education and training. The rapid rate of increase in our society's knowledge and information base, the impact of technology on our working and home lives, and the consequent need for lifelong learning mean much higher levels of demand for education and training. Traditional, classroom-based approaches to meeting the demand are unlikely to cope. Information and communication technologies are providing an effective alternative through e-learning.

The Business of e-Learning

The e-Learning Market

While much of the rhetoric surrounding e-learning can fairly be called "hype," and some may have reservations about its effectiveness, it is clearly going to have a significant impact on the business of education and training. Some early predictions suggested that the value of the global e-learning market would approach US$300 billion by the end of 2003.

Four fairly distinct e-learning products have evolved. These are content, delivery and learner support, 'earning management systems integrating the content, delivery, learner support, and adminis-tration of the learning, and a range of consultancy service spri-marily assisting with the design and implementation of e-learning solutions.

e-Learning product	Example
Content	NETG, SMARTFORCE, universities, schools
Delivery and learner support	Many universities, schools
Learning management systems	Blackboard, WebCT, Click-to-Learn
Consultancy services	Many examples including GTKnet

As e-learning has developed, a number of specific market segments have emerged. Broadly speaking, the market can be divided as follows:
- the academic market;
- the corporate market; and
- the consumer market.

There are close links between these arising from the fact that many learners engage in all three markets and that many e-learning products and services have applicability in more than one market.

The potential market size for e-learning has created interest in the commercial opportunities it may offer. A number of business models have evolved including income generation through con-tracts, pay per use, and advertising/related product sales.

Income generation	Example
Contracts	Many examples
Pay per use	ASQ, IBM, Microsoft
Advertising/related product sales	Barnes & Noble University

While the commercial potential of e-learning is evident, few would claim that this potential isclose to full realization. Successful commercial applications are being held back by factors linked to the development of the Internet in general, for example:

- the apparent reticence of consumers to engage with e-commerce; and
- the need for more universal access to reasonable band-widths.

It is clear that the market for e-learning is continuing to expand. There is now a diversity of products and services to support the market. Providers of products and services are working together to design and implement integrated solutions. The learning management systems underpinning the products and services are becoming more comprehensive, more integrated, and more "intelligent," and as the technology develops it is facilitating more personalized and motivating approaches to learning. It is not only a growing market, it is a market that is maturing.

A Business Planning Framework

A business planning framework can be built in many ways. One possibility is to use the elements of a quality cycle such as Approach, Deployment, Results, Improvement (ADRI).

1. Approach incorporates the specifications of the strategic intent and the development of a detailed business case for the project. It also includes the work that needs to be done to promote and sell the solution to stakeholders.
2. Deployment involves the production, delivery, and implementation of the solution.

3.   The Results stage evaluates the solution.
4.   Improvement means consolidating the learning from the project, the identification of improvements, and building on the achievements of the project.

Designing and Implementinga Multimedia or e-Learning Solution

Approach

The first step in designing a multimedia product or e-learning solution is to understand the users' needs. This needs analysis usually comprises a variety of market research strategies including stakeholder interviews and brainstorming sessions and focus groups with typical users. Analysis of this data can clearly establish or confirm both the business goals and the user's goals in relation to the proposed product or service.

Analysis of the market research and stakeholder data also begins the process of documenting the scope of the solution design and functional requirements, in particular the:
-      user/learner requirements;
-      content requirements;
-      delivery and support requirements; and
-      organizational and administrative requirements.

Once established and signed off on, these requirements form the basis of the subsequent design and development processes.

Product Design

A number of critical elements need to be considered in the design of multimedia and e-learning products, such as:
1.   Strategic intent, i.e., there must be a clear and agreed articulation of the strategic intent of the product, the rationale behind its development, and its purpose.
2.   Learning design, which is applicable at a number of levels. At the highest level, it concerns the educational philo-

sophies and paradigms that underpin the solution (for example, constructivist or instructivist). Learning design also involves media selection and ensuring that the technology considerations do not override the educational and administrative efficiency requirements of the solution. At a more detailed level, it includes translation of the learner's needs into the particular teaching and learning approaches and strategies to be applied within the product (for example, building on existing knowledge, ensuring clear linkages between content and objectives, and building a community of learners where appropriate). Ultimately, learning design results in the "storyboarding" of the solution.

3. Content includes the breadth, depth, and authority of the subject matter. This element needs to be backed up by quality assurance processes including contribution and review by recognized (and accredited, where appropriate) subject matter experts.

4. Interface design and usability must be considered because multimedia and e-learning products create an environment within which the user or learner operates. A number of factors contribute to the users' perception of that environment and the ease of working within it. These factors include concepts such as interaction design, navigation design, information design, screen design, graphic design, and usability. They are critical to the effectiveness of the product, particularly for products designed for markets that are only beginning to grow accustomed to the medium.

5. Learner support ensures the provision of assistance to the users at all stages of interaction with the product. The support can range from simple tracking aids or help menus on a CD-ROM to the planning for intervention by teachers, mentors, or learning facilitators in an e-learning solution.

6. Utility of content must be evaluated to consider the potential for multiple use of the content and functionality of the product due to the significant capital cost of multimedia and e-learning products.. An assessment of the potential utility of the product involves both technical issues and learning design issues. It includes interoper-

ability, customizability, and the application of appro-
priate international standards such as learning object
design and metadata.

7.   Design for accessibility is necessary since many govern-
ments have implemented legislation to ensure that the
rights of people with disabilities are protected. These rights
need to be reflected in the design and useability of multi-
media and e-learning products. International standards on
accessibility have been developed and willinfluence both
the educational and technological design of products.

Development and Production

Traditional development processes have followed a linear, sequen-
tial approach to development and production. Such approaches are
relatively inflexible and time-consuming. More sophisticated ap-
proaches recognize that each of the techniques and skills associated
with design and development has a continuing influence throughout
the project. This approach requires an effective team-based opera-
tion. The approach is based on:

-       recognition of specialist roles in the design and produc-
tion process;
-       recognition that each of these roles informs all aspects of
design and production;
-       shared risks and responsibilities; and
-       a production environment that is innovative, creative, and
trusting.

The specialist roles required for the team can vary significantly
depending on the nature and complexity of the product. However
those roles may include:

-       project manager;
-       creative director;
-       instructional designer;
-       subject matter experts;
-       screen designer;
-       programmer;
-       video, audio, and graphics specialist;
-       Web master; and

-        database designer, animation artist, etc.

Project Documentation

Different models of design and production require different forms of documentation. Documentation for a typical multimedia or e-learning project would include:
-        an initial project briefing document;
-        a project scope document;
-        a production design document describing in detail the features and functionality of the product or system;
-        evaluation documents; and
-        a maintenance arrangement or agreement.

Most projects involve a level of learning on the client's part (and not infrequently on the developers' part). A consequence of this learning is a need to diverge from the agreed scope or product design. Documented agreement on the process and consequences of change through an appropriate change management protocol should be established at the beginning of the project. In a similar manner, the risks associated with the project need to be recognized and documented, as do the ways in which it is planned to address the risks.

Planning for Evaluation

In a rapidly changing and not clearly understood environment (both educationally and technologically), standards for the design and development of multimedia and e-learning products and the related criteria for evaluation are not stable (even where they do exist). In addition, there are wide variations in factors such as available budget, available expertise, etc. The final evaluation of a product needs to take into account the variety of these contextual and cultural factors. It is important that planning for evaluation occur in the design and development process and that these factors and their impact on product design and development be documented.

Implementation: Change Management

There is nothing radically new about the process of implementing

e-learning or related multimedia products. All change can be difficult, and in this case we are attempting to change a model of education and training that has been in place for hundreds of years. Total commitment from the management of an organization, sound project management of the implementation process, development of extensive communication strategies, and the incorporation of appropriate professional development and performance management strategies are all essential elements.

Some Characteristics of an e-Learning Solution

Assessment and curriculum design and development	- Organizational and individual needs assessment - Setting competency standards for performance - Goal setting and incentives - Roadmap to educational success
Branded educational content	- Proven, high-quality intellectual capital - Timely, relevant, and consistent information - Keeping fast-changing content current, dynamic, and fresh - Off-the-shelf and customized
Broad and easy access to information	- Anyone, anywhere, any time, any subject - Multiple technology-based delivery methods - Synchronous and asynchronous - Just-in-time and just-in-case
Engaging user experience	- Rich multimedia experience - Realistic simulations and role playing - Video-based teaching and storytelling - Advice and explanations from experts/mentors - Animated case studies and examples - Interactive games, activities, and music
Regular reinforcement	- Personalized and/or real-time mentors - Web casts, interviews, and live events - Practical exercises and application - Facilitated workshops and discussion groups - Desktop advice, special events - Weekly newsletters and relevant articles
Collaborative online communities	- Access to fellow learners, instructors, relevant professionals, and experts - Access to system knowledge base - Learning group, company, and global communities
Centralized tracking and administration	- Easy automated knowledge management - Tools to evaluate progress of individuals and groups - Assessment activities to identify learner needs and goals - Data to assess return on investment

Scalable technology	- Application of open industry standards - Scalability - Flexible technology to include groups or the entire organization - Easy integration with client's internal systems - Delivering media-rich broadband experience
Organizational consulting, implementation, and integration	- Integration with existing curriculum and training delivery system - HR and IT administration training - Employee incentive and accreditation programs - Performance management - Customized management training support - Behavioral change measurement and reporting

A Framework for the Evaluation of Multimedia and e-Learning Products

The growth of multimedia and e-learning has been rapid and to a significant extent experimental. A great deal of progress has been made with the technology but this progress has inevitably been accompanied by significant mistakes and errors of judgement in implementation. Learners, trainers, education and training organizations, entrepreneurs, investors, Web site developers, and governments have had to learn from these mistakes and we are only now beginning to have sufficient experience with multimedia and e-learning products to assess their value to all of the stakeholders (relatively) objectively. Hence we can start to use formal evaluation strategies and base future planning and actions on the results of those evaluations.

However, it is critical to see these evaluations in perspective. Many evaluations are narrowly focused and the results are used outside the context of that narrow focus. Methods of education and training have changed little for a long time. Almost every other aspect of modern life has been impacted significantly by rapid developments in technology. Almost every industry and service has been revolutionized in the past 50 years by the impact of technology. The education and training industry is only now beginning to feel this impact and to realize that it might seriously affect the way it does

business. There is still a long way to go before there is a common understanding of what will probably be a new paradigm for education and training, and hence there is a good deal of confusion about the processes, results, and interpretation of the first small steps in a new direction.

Direct comparisons of the "new" with the "old" are generally inappropriate. The issue is not simply the quality of the multimedia and e-learning products, or the effectiveness of the technology, or any other single component of the matrix, but rather the interaction of those parameters with the culture of the stakeholders.

Evaluation: from which perspective?

Evaluation of traditional education and training and related "products" occurs in an environment of established (although often not articulated) relationships between stakeholders. For traditional face-to-face provision, therefore, evaluation occurs in a context of all the players having well understood and accepted expectations about their roles.

In an e-learning environment, clear roles and expectations have not been established. Each of the stakeholders has different concerns and different ways of assessing their return on investment (ROI). Stakeholders who have been closely aligned with traditional provision have new roles to negotiate and integrate into their thinking and into their interpretation of evaluation outcomes.

Often a ROI assessment by stakeholders (and evaluators) will be made without taking into account those changed roles and expectations. Learners, for example, might evaluate an e-learning experience without taking into account the fact that the new model is actually based on a requirement that learners be more independent and able to motivate themselves. Teachers may ignore the fact that they are now relied upon to facilitate the learning process rather than be content experts. Learners and teachers may not recognize their new dependence on the design of learning resources as those resources become a more critical component of the total learning environment. These are all new and still evolving roles and expec-

tations. Not all stakeholders have understood or accepted these roles. While it is obviously possible (and important) to evaluate e-learning products using established criteria, it is important to see evaluation in the broader context of a total learning environment where not all of the players understand or fulfill their roles.

Much of the initial effort in evaluation of e-learning products has focused on usability. Usability is critically important but it is not the only important component of a multimedia or e-learning product. Like most of the other components, it is very dependent on learner background, prior knowledge, familiarity with the learning environment, difficulty of content, etc. There is now a need to see usability in perspective as only one of a range of components critical to the successful implementation of multimedia and e-learning products.

Proactive evaluation of e-Learning products

From a developer's perspective, the traditional evaluation of learning resources cannot be separated from the difficulties and complexities arising from the factors described above. In particular:

- Evaluation of e-learning resources frequently occurs without taking into account contextual and cultural factors.
- In a rapidly changing and not clearly understood environment (both technologically and educationally), established standards for the design and development of resources and related criteria for their evaluation are not stable (even where they do exist). This can lead to subsequent evaluation of factors that were not part of the general thinking at the time of development.
- Development of good e-learning products is an expensive process and often the compromises needed as a result of limited budgets or organizational limitations are not well documented. Evaluation often occurs without consideration of these compromises and therefore potentially valuable evaluation data are lost

A proactive approach to evaluation can provide a framework for both the development and evaluation of online and multimedia products. The major components considered in the proactive framework are:

Strategic intent	A clear indication of purpose, rationale, stakeholders, interrelationships, and the business model
Learning design	The paradigms, philosophies, and strategies applied to the way in which the information will be presented
Content	The appropriateness of the breadth, depth, and source of the subject matter
Interface design and usability	The environment in which the learning will occur
Learner support	Provisions to assist users
Administrative effectiveness	Implications for administrative and management systems
Outcomes	The objectives, understanding, and/or knowledge demonstrated as a result of the activities

Establishing criteria that can form the basis of an evaluation cannot happen without considering the context in which the e-learning products have been (or are to be) developed. These contextual factors go beyond the learner and the learning environment. In a new and developing field, issues of innovation, creativity, and the application of new and emerging technologies are also important. More recently, factors such as interoperability, multiple use, compatibility with international standards, etc. have also become important. The table below shows the major contextual factors considered to affect the design of each of the components of an online or multimedia product:

Users and their context	What is known about users, their learning environment, and their motivation
Creativity	Opportunity for new approaches to interactions
Technology	Which aspects of technology inform and influence the design and use
Utility	The potential for multiple use of content and functionality
Administrative efficiency	Budget considerations, etc.
Documentation	How well each of the design steps were documented to provide data for formative and summative evaluation processes

The major components in the design and development of e-learning products and the major contextual factors should be considered together in any evaluation of the products. A useful model is a matrix, as illustrated below. It is not intended that this matrix be seen as some form of checklist; it is merely a framework to facilitate consideration of the components and contextual factors in a comprehensive, integrated way.

Multimedia and e-Learning development: major components and contexts

Context / Multimedia/e-Learning component	Users and their context	Creativity	Technology	Utility/ interoperability of content and functionality etc	Administrative efficiency	Documentation
Strategic intent						
Learning design						
Content						
Interface design & usability						
Learner support						
Admin effectiveness						
Outcomes						

Evaluation the major Components of e-Learning and multimedia

Strategic Intent

Within the assessment of strategic intent, developers and evaluators must consider overall project budget, the interests of all stakeholders (users, teachers/facilitators, designers and developers, technology experts, senior management, the organization) and operational considerations including staff/professional development.

Learning Design

Computer-based environments can be places for users to explore, manipulate, and communicate, rather than simply a place where they are "taught." Developers must conceptualize the learning process from the users' perspective rather than from that of the content alone. Evaluation should encompass a pedagogical approach, pathways and sequencing, course structures, scaffolding, the amount and complexity of content, the role of assessment, presentational strategies including media selection, and the appropriateness of collaborative and community-based approaches to learning. Each of these factors must be judged in relation to relevance to users and their learning context, the creativity of the solution, the way in which the technology is been used to further the objectives of the product, the utility and interoperability of the solution, its administrative and management implications, and the quality of the associated documentation.

Content

The accuracy, integrity, relevance, and totality of the content are obviously central to the evaluation. However, when content is placed online or in a multimedia program, careful analysis of its nature in the selected medium is necessary. Developers and evaluators need to note the nature of the content base and consider the appropriateness of its

presentation. For example, the content can take the form of:

- a static set of text and images predetermined by the client and presented to the user as information; or
- a dynamic state not specifically defined but sourced, repurposed, constructed, and enabled for a variety of users.

Interface Design and Usability

Interface design involves positioning the user in the "illusion" of a virtual environment with representations, metaphors, icons etc. Evaluators need to go beyond conventional approaches to usability that are based on contexts more suitable for e-commerce. They need to consider interactive design, navigation, information design, screen design, graphic and media elements, and overall aesthetics.

User Support

A successful user experience may require much more than good interactive content. Evaluation should consider the appropriate use of tracking aids for learners, help menus, frequently asked questions (FAQs), and the organizational support provided through learning facilitators, mentors, etc.

Utility of Content

The significant capital cost of online/multimedia programs requires consideration of the potential for multiple use of the content and functionality. This should be a critical design and evaluation requirement and extend to issues such as interoperability, customizability, and the application of appropriate international standards (for learning objects, metadata, etc.). The utility of a resource can be assessed within the resource, across resources, and across media (edit online, print). An assessment of utility should involve technical issues, learning design issues, and granularity of content.

Summative Outcomes

This paper focuses on the evaluation of e-learning products compared with established criteria for their design and development. However, summative evaluation of all components of the e-learning strategy and its implementation and an assessment of the ROI for all stakeholders are needed. These complement and inform the criteria-based evaluation of the e-learning products themselves. The table below represents a possible framework for summative evaluation.

Summative evaluation of multimedia and e-Learning products

	Quantitative		Quantitative	
	Number of users	Extent of use	Learning/ understanding achieved	User satisfaction
Strategic intent				
Learning design				
Content				
Interface design & usability				
Administrative effectiveness				
Learner Support				

Multimedia and e-Learning Product Evaluation Checklist

LEARNING DESIGN
Course structure

		Comments
Clear course/lesson/topic or similar (3)-level structure		
Level structure consistently applied		
Smallest unit in appropriate chunks		

Pedagogical approach

		Comments
Specificity of learning outcomes		
Instructivist/constructivist		
Pathways & sequencing		
Customization		

Core presentational strategy

		Comments
Screen text-driven		
Audio-driven		
Video-driven		
Audio supplementary		
Video supplementary		

Learning design components

	Comments
Print materials	
Recognition/acknowledgement of prior learning	
Mentors	
Links to external content/Internet resources/portals	
Chat rooms	
Synchronous training events	
Learning community: forums (learner/learner; learner/instructor)	
Push e-mail/newsletters	
Accessibility & customization	

Interactivity and Feedback

	Comments
Interactions throughout learning; not just at the end	
Initial thought-provoking interaction to establish relevance	
Frequency of interactions: learners should not go for more than 5 to 10 minutes without some form of questioning or interactivity	

Type of interactions: including multiple choice, drag and drop, hot spot, simulations, and free response	
Level of interactions: include interactions at the knowledge, skill, and application to job levels	
Presentation interactions such as roll-overs and hot spots	
Feedback: if learner is right or wrong; what the correct answer is, and why	

CONTENT
Subject matter

		Comments
Accuracy		
Currency		
Comprehensiveness		
Relevance		
Integrity		
Link to objectives and course goals		
Easy to update and maintain		
Uniquely created/reusable		
Extensible		

	Comments
Links within a course to individual or company-specific contexts, examples, policies	
Links to diverse external sources of content	
Credibility of developers	

Instructional structure

	Comments
An introduction describing what will be learned and why it is important	
Job-related examples	
Materials are targeted to reading level, depth, and experience of the audience	
Summarize key learning points	

Testing

	Comments
Pre-assessment	
A recommended study plan based on pre-assessment	
A post-test or mastery test to document learning outcomes	

Clear specifications linking objectives to content to testing regimen	
Randomization of test questions	
Test item bank containing 2-3 times the number of items in a test	

INTERFACE DESIGN AND USEABILITY

Navigation

	Comments
Essential forward, back, and options choices	
Complete/partial learner control	
Lean and clean; 90% of space for learning presentation	
Progress indication within topic	
Bookmark functionality	
Options: return to menu, glossary/key terms, job aids, FAQs, notes	
Menu of lessons/modules record progress of completion	
Always be clear "what the student does next"	

Screen design

	Comments
Full-screen presentation for learning material	
Simple and clean; not cluttered with unneeded images or objects	
Minimal scrolling	
Few colors that work well together	
Some variety of text and graphic presentation	
Judicious use of different fonts and colored text	

Media elements and graphics

	Comments
Part of a total graphic design	
Optimized for target specifications and screen settings	
Meaningful graphics that add value	
Specific and unique role for media elements	
Easy to navigate from one medium to the next	
Closed-caption option	
Audio production quality	
Video production quality	
Low- and high-bandwidth media options	

Information design

	Comments

Interaction and input/output design

	Comments

Unique customization features

	Comments
An initial individual or company-specific message	
Tools to generate customer-specific messages	
Accessibility	

Performance

	Comments
Responsive	
Minimal initial set-up	
Rapid screen changes	
Synchronization of media elements	

USER SUPPORT, UTILITY, AND ADMINISTRATION

Tracking Aids for Students

		Comments
Acknowledgment of registration		
Lesson completion e-mail		
Module/course completion e-mail		
Access to information about courses/modules attempted or completed		
In process e-mail		

Industry standards

		Comments
Granular course structure		
Objective linked to content linked to assessment		
Compatible with IMS, IEEE, and SCORM		

Documentation, reporting, and record keeping

	Comments
Simple, not overly complicated reports	
Data that can be transported to corporate systems, other LMS, or other applications	
Key activity and completion measures	
Key learning outcome measures	
Item analysis data on each item and the percentage of people choosing each possible answer	
Visual representations (pie charts or bargraphs) of key results	
ROI data where appropriate	

Implementation services

	Comments
Print guides/aids	
Tools and templates	
Training	
Support	

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2. THE APPLICATION OF MULTIMEDIA IN E-LEARNING: TAIWAN'S EXPERIENCE

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Background

Multimedia are a set of information technologies that satisfy the growing demand of end users for richer interactive experiences. They can involve a combination of three-dimensional graphics, animation, images, video, text (including data), and sound in digital formats within a wide variety of environments. Although many e-learning courses are already in use and being delivered to learners, many do not use multimedia appropriately. Most instructors do not really take advantage of multimedia and do not integrate it into their e-learning courses. Possible reasons include: poor Internet infrastructure; inadequate understanding of the role of multimedia in the development of an e-learning course; lack of equipment; incompatibility; obsolete equipment or equipment in disrepair; a lack of training in equipment use for professors; and so forth. This paper introduces the drivers that are encouraging effective e-learning implementation in Taiwan and demonstrate an easy-to-use multimedia tool.

Taiwan's e-Learning Environment

In today's knowledge-based economy, acquiring and utilizing the latest information and skills quickly are keys to gaining the edge over competition. But with the wealth of information available, and the short time cycle of current information, conventional training methods can no longer satisfy the need of a business to train employees with the latest information. This is where e-learning comes in. Using a combination of Internet technologies to deliver instant, up-to-date information and knowledge almost anywhere in the world, e-learning provides several advantages over conventional classroom training methods:
- instant, global distribution and updates;
- accessible and flexible learning anywhere, anytime;
- self-paced format accommodating all levels and schedules;
- more cost-effectiveness than large corporate training facilities; and
- consistency of information: everyone receives the same information in the same way.

The trend in e-learning usage is obvious; companies are shifting their training investment to new strategies based on technology and external services. Although spending on e-learning is still very small (about US$11 million in 2001), the rate of increase of 113% is surprisingly high. It is expected that, with 8 million workers in the office and 5 million students on campus, the e-learning market in Taiwan has a potential value US$10 billion.

Increased training expenditure equals increased performance. The current question is how to maximize the benefits of training Several sources show that there is significant potential for the more effective application of e-learning in Taiwan and to a wider market.

Leading Providers of IT Products

Taiwan is best known as one of the leading providers of IT products, excelling in areas of manufacturing such as CD-ROM drives, monitors, and LCD panels. But intensive competition in the global market (particularly from Japan and the Republic of Korea), challenges Taiwan businesses. That coupled with the growing

economic threat of the Chinese mainland in coming years means that there has never been a better time for Taiwan to invest in e-learning. The workforce is in need of better-quality training to increase productivity.

Internet Infrastructure

Before there is any serious investment in e-learning, some prerequisites must be met.

Bandwidth: With the high level of multimedia content, e-learning requires significant bandwidth. A high-speed Internet connection is a must. According to a survey, broadband users spend a lot more time online and sample a wide range of content (Berchtold et. al., 2001). Fortunately, Taiwan has one of the highest broadband penetration rates in the world, second only to the Republic of Korea at 15%. Of these 0.8 million are ADSL users and 0.4 million cable modem users.

The following figures give an indication of Taiwan's Internet infrastructure:

- Population: 23 million;
- Fixed-line users:13 million (penetration rate 57%);
- Mobile phone users: 21 million (penetration rate 94%, #1 in the world);
- Internet users: 7.8 million (penetration rate 35%);
- Broadband users: 1.2 million (penetration rate 15% of Internet users , #2 in the world); and
- ADSL users: 0.8 million (penetration rate 9% of Internet users, #2 in the world).

Wireless: Wireless LAN is the future for home and office networking, providing multiple connections to a single broadband connection without the hassles of wires and wall plugs. It is also the future of e-learning, increasing the number of potential clients. Research indicates that wireless LAN technology is already mature in Taiwan. Twenty percent of Internet users have tried it and 92% were either satisfied or felt "OK" about it, which is a good foundation to

build on.

On-line Behavior: The Taiwanese people are already computer literate and Internet savvy. Introducing them to e-learning will be easy. Research shows that Taiwanese users have an average Internet age of 3.5 years, long enough to familiarize themselves and surf at will. They already use the Internet for video on demand, online broadcasting, and file transfer. These uses are all relevant to e-learning; furthermore, the time each person spends on the Internet amounts to 2 hours per day, more than enough time to take a course.

Government Policy: As with any major program, e-learning will require the full support of the government to be implemented effectively. The government has been quick to recognize the potential of e-learning and has already implemented a major e-learning policy, with the goal of transforming the country into an "e-society." The policy involves building a national e-learning infrastructure to promote e-learning. The national infrastructure will consist of a content provider to supply the materials, equipment, and activities needed to the "gateways" located around the country. The gateway can be a school, a classroom, family home, an office, or even a caf Through the use of learning devices like computers or notebooks, people will connect to the gateway and acquire what they need.

Eventually, the experience gained from e-learning will be able to be applied and integrated into all facets of the society, from e-commerce, e-entertainment, e-communication, and e- medical care to e-culture. They will interconnect with each other to form a true "e-society."

Key Success Factors in the Application of Multimedia

Taiwan is in a position to provide an ideal environment for e-learning. All necessary infrastructure is in place, wireless technology is available, and the people are prepared with full government backing. However, many businesses still have difficulties in implementing their e-learning strategies effectively, even

with heavy investment. Many CEOs complain that after they buy all the expensive equipment required, employ cutting-edge technology in e-learning programs, and launch the programs with high expectations, they are not satisfied with the results. This could become a familiar scenario for those who are not aware of the limitations of e-learning. As with any new technology, there will always be some problems due to inexperience and unfamiliarity. The factors that can undermine an e-learning strategy are:

- Too much focus on promising technology: Too high a level of sophistication in the technology can result in an unstable learning platform. The technology should be appropriately applied.
- Underestimation of the complexities of learner interactions: Learning is a complicated process, requiring cooperation on both instructor and learner sides. Subtle interactions can be lost through the Internet.
- Poor use of multimedia: Failure to utilize the full potential of multimedia can lead to poorly presented material. It important to adapt textbook knowledge to the online environment.

Learning can be delivered through a variety of means. These can be divided into two main categories, synchronous and asynchronous. Given that different training programs have different needs, choosing between these delivery methods or a mixture of the two will enable the building of a tailormade e-learning strategy to suit the distinctive needs of each business.

Gagne (1977) gave a set of well-defined events of instruction: gaining attention, informing the learner of the objective, stimulating recall of prerequisite learning, presenting the stimulus material, providing "learning guidance," eliciting the performance, providing feedback about performance correctness, assessing the performance, and enhancing retention and transfer. We can also argue that an effective e-learning program should take into consideration a number of other essential learning activities such as delivering lectures and incorporating interactions between instructors and learners or learning materials. In addition, applying multimedia appropriately in e-learning

greatly enhances its effectiveness.

The application of e-learning requires an appropriate mix of media. When learners are inexperienced and concepts involve movement, the use of animation and video will be more effective than simple text and graphs. However, heavy use of animation and video has associated cost problems and is time-consuming to develop.

In short, a good learning program can be enriched by the addition of multimedia. The advantages it provides allow learners to be fully immersed in a learning environment. However, a fundamentally poor or poorly designed learning program will remain poor no matter how much multimedia are added. For multimedia to enhance learning, it must have authenticity, that is, it must present the learning material in a relevant and appropriate manner. The key to successful e-learning is using multimedia to make the course display authentically while ensuring easy accessibility. Multimedia-enhanced learning can be seen as the blending of technologies to achieve desired outcomes.

Case Study and Demonstration: Webguider

Webguider is a tool that enables an instructor or a learner to keep track of a whole sequence of instructional events (both audio and video) synchronously on the Internet. This includes accessing any desired Web site for instructional activity. The tool can effectively help an instructor design an e-learning course by systematically recording and organizing Web-based materials. Learners, on the other hand, are allowed to retrieve the recorded instructional materials installed on the server freely and repeatedly and to replay and review all of the course work on the Internet without feeling disoriented or overwhelmed.

Webguider can transmit multimedia data (including video, audio, and texts) to the client, while keeping the bandwidth requirement to an acceptable level. To achieve the goal, the instructor first records a video/audio clip when s/he is giving a lecture using course material on the Web. The recording mechanism not only records video/audio, but also keeps track of mouse and keyboard events

when the instructor is explaining course material on the Web. The recorded course, including audio/video clips and an event list, is kept on a Web server. When a student requests the recorded course, s/he should be able to view the streaming video/audio immediately, together with the mouse and keyboard events being executed. In other words, the video is synchronized with the mouse/keyboard events that take the client browser to the appropriate Web site (possibly where other course material resides, or to any other reference site on the Web). The major advantages of Webguider are:

1.   The video component is kept small (with resolution of 160 × 120 pixels, 8 frames per second). It consumes less than 20 Kbits per second (Kbps), perfectly suitable for 33.6-K modem dialup.

2.   The synchronization between video and mouse/keyboard events makes the system an ideal guiding tool for learning on the Web.

3.   Video recording is quick and easy using a simple PC camera. Instructors can control the recording procedure. They can follow their regular teaching pace and style.

4.   Everything on the Web can become the instructor's course material. Learner access to other Web sites does not lead to intellectual property infringement.

The following snapshot demonstrates Webguider in action. The whole page is partitioned into two frames. The lower one is the course material coded in regular HTML format; the upper part is the GUI and video player, which show the facial expression of the instructor giving a lecture. The GUI includes Web page annotation functions, record/play/stop buttons for videos, the COD file being played, and common Web browser functions such as previous page, next page, reload, bookmark, etc.

Webguider has annotation capability. The instructor can use Webguider to put annotations on any page on the Web and thus customize it for the course. For example, in the next figure, the instructor can use Webguider to link to www.yahoo.com and insert annotations (circles and rectangles in this case) to explain its directory structure, classification concept, etc.
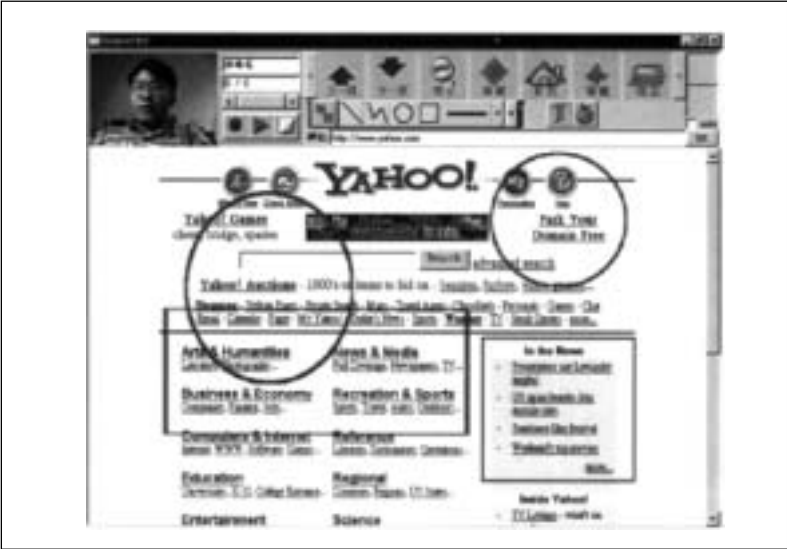
The instructor can also use multi-host interactive objects to add instructions. For instance, in the above example, all the triangles are multi-host interactive objects, and the instructor can click and drag inside the triangles to move the objects, or click on the corners to

rotate them. The instructor can use the interactive objects to show concepts/theorems in geometry or other topics that are best explained using visual inspection/explanation. After listening to the instructor's lecture, the student can also move/rotate the objects to achieve the effect of "learning by doing."
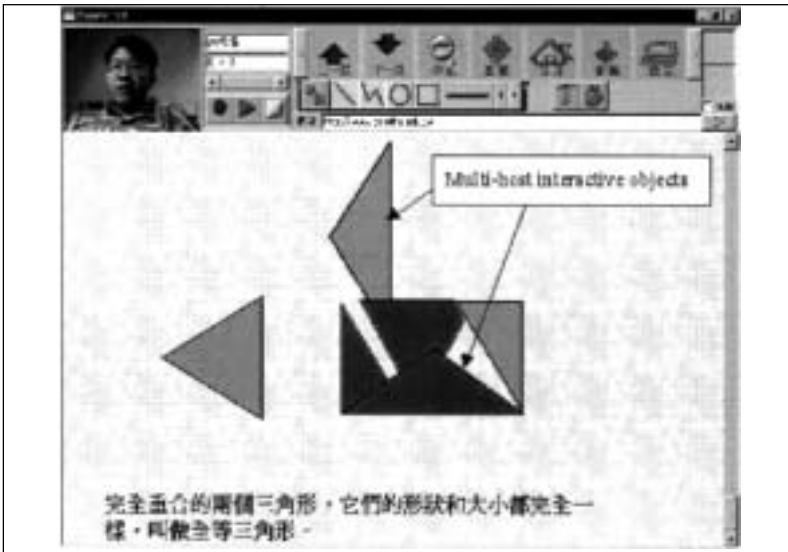
Conclusion

Although business spending on e-learning is still relatively small, Taiwan's potential for e-learning cannot be questioned. Within a few years, we can expect to see e-learning replace conventional training methods as the primary training strategy. As a leading provider of IT products, Taiwan provides an ideal environment for e-learning with the necessary infrastructure in broadband, wireless, and Internet-savvy people. This paper also shows that applying multimedia appropriately can enhance the effectiveness of e-learning dramatically. The key to successful e-learning is the use of multimedia to make the experience authentic while making it accessible.

With the Webguider software, learners are equipped with the ideal

tool for e-learning. Its low bandwidth requirement and high level of dynamic dialogue and interaction effectively take full advantage of available multimedia technologies in delivering e-learning courses.

It should be emphasized that effective e-learning is not just about technology or multimedia application. It is also be about the culture of learning. Encouraging learners to share experiences with participants is essential in implementing a successful e-learning program.

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3. E-LEARNING — CONTENT, DESIGN, AND TOTAL SOLUTIONS: AN INTRODUCTION TO GTKNET'S E-LEARNING EXPERIENCE

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e-Learning is a hot topic in Taiwan and around the world. Following in the footsteps of developments in the USA, there are many vendors providing e-learning solutions in Taiwan. The market has been getting "hotter" over the last two years. The Taiwan government is paying much attention to this industry because it has good potential for development. For example, the following projects have been recently launched or are in the planning stages now:

- planning for the national digital learning project (NT$4 billion) for 2003;
- Ministry of Economic Affairs digital content flagship project (2002);
- Ministry of Education's e-learning project; and
- inauguration of the e-learning industry strategic alliance.

The e-learning market is growing all over the world. The International Data Corporation (IDC) estimated that the value of the worldwide market will hit US$23.11 billion in 2004 and US$3 billion for Asia. The methodology of training is shifting from 80% classroom based in 1985 to 50% e-learning in 2002. These changes are supported by many success stories around the world, for example:

- The government of Norway established an e-learning network to serve the needs of education and training for 4 million citizens (August 2000).
- The American Bureau of Tax Affairs signed a US$88 million contract for e-learning consultancy services (August 2000).
- The US Army signed a contract with Price Waterhouse Coopers for the Army University Access Online (AUAO) project. Estimates are for 80,000 students and expenditure of US$450 million in five years (December 2000).
- IBM has implemented its Basic Blue project to train 5,000 new managers, 75% using e-learning. Anticipated corporate savings exceed US$24 million (2000).
- According to the research of Market Data Retrieval, 70% of universities in the USA are now providing e-learning courses.

Why are they so positive about e-learning? The answer is that e-learning has many benefits for an organization.

1. *Simplifying the training process*
   Human resources (HR) staff can leverage the functions of a learning management system to simplify their planning and management processes.

2. *From passive learning to "active learning"*
   "Train as you need" can be realized through e-learning. e-learning provides the best mechanism for knowledge workers to become ongoing, active learners.

3. *Reducing cost*
   Classroom training consumes a lot of resources, such as space and accommodation, traveling costs, and heavy administrative workloads. e-learning is cost efficient in comparison.

4. *Better performance evaluation*
   The reporting and management functions of e-learning systems can provide a learning profile for each individual, resulting in better performance evaluation for training departments.

5. *Developing quality content*
Turning classroom training into a Web-based course can standardize the training material, so that every learner receives the same quality content.
6. *Expanding learning opportunities*
Freed from time constraints, each learner can work at his or her own pace to learn, to ask questions, and to learn from others.
7. *Increasing interactivity*
Leveraging the most advanced technology, multimedia courses raise the learners' interest and provide alternate ways to learn effectively.

Introducing Global Trend Knowledge Network Co., Ltd.

Global Trend Knowledge Network Co., Ltd. (GTKnet) is the premier e-learning provider in Taiwan. GTKnet is confident in making this claim because its strength is the result of the strategic integration of three solidly established organizations. Each of the three offers unique but essential ingredients for success in e-learning.

Trend Micro Inc. is the leader in Internet antivirus products. Its customers include Boeing, Bank of America, HP, Chase Manhattan Corp., Lucent Technologies, GTE ConAgra, Coca-Cola, MCI WorldCom, UAL, Sprint, and Electronic Data Systems. Listed both on the Tokyo Nikkei and NASDAQ USA, Trend Micro Inc. (as of Feb. 2001) has market capitalization of US$5.7 billion. In the fast-changing IT environment, Trend Micro will ensure GTKnet stands at the cutting edge of Internet technologies. Headquartered in Tokyo, Japan, Trend Micro has business units in North and South America, Europe, Asia, and Australia. Many companies have a global vision but with the support of Trend Micro, GTKnet has the capacity to achieve that vision.

Commonwealth Publishing Inc. was established in 1982 and has accumulated a tremendous amount of content, both in quantity and quality. This licensed content, ranging from a vast range of well-known Chinese publications to the Harvard Business Review, will be available to GTKnet and its customers.

The Institution for Information Industry (III) is an organization supported by the government and enterprises of Taiwan. Its purpose is to research and develop IT in Taiwan. Recognizing the impact and efficiencies of e-learning, the III developed Good2U.com which is a B2C e-learning operation. Knowing that a successful e-learning operation requires more than mere software and hardware, GTKnet merged with Good2U.com. It fused GTKnet's valuable experience in managing an e-learning environment and years of government research.

In addition, GTKnet has built global relationships and partnerships with companies such as Learning Solutions for the Human Enterprise, Smartforce; and McGraw-Hill. These partnerships ensure that it follows mainstream applications, technologies, and international standards. In addition, they expand the possibilities for new business.

GTKnet has access to the abundant resources of Commonwealth Publishing Inc., Trend Micro Inc., and the III. These resources have allowed GTKnet to become a true e-learning total solutions provider. Unlike many e-learning providers, we have a clear vision of a well-designed e-learning environment, complemented by the tools and ability to build it.

e-Learning success factors

To apply e-learning in an organization, we need three critical success factors: e-learning tools (platform and authoring tools); online content; and training support services:

eIDEA3.5 Platform

An e-learning platform is for training administration management and teaching/learning management. The functional structure could be described as illustrated below.
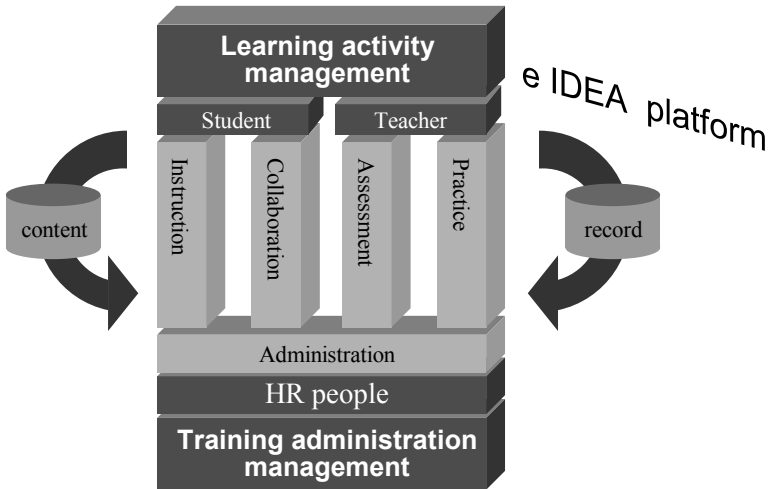
eIDEA is the first commercial e-learning platform developed in Taiwan. Through years of R&D by the III, it is the most complete, versatile, and user-friendly platform available in the Republic of China. eIDEA enables interaction between content, students, and teachers. All activities, from chatting, through to homework and assessment can be monitored and managed. eIDEA is modularized for versatility, making it easy to fit to a client's specific needs. It is also capable of being integrated with client companies' HR or other back-end systems. For the eIDEA platform, power does not equate complication. Once our training is completed, a trainee can operate the system if he or she knows the meaning of "double-click."

The development of the eIDEA platform is continuous, and the next generation of the platform is evolving to integrate with a content management system. In addition, new e-learning systems will have a very close relation with knowledge management systems. E-learning will become a key to implementing knowledge management because it will assist in the formation of a learning culture. As people become used to sharing their experience and knowledge during learning using the interactive functions of the learning management system, they will be more comfortable using a knowledge management system.

Standard platform	Next generation
Course scheduling and organization	Object-oriented, n-tier, Web-based architecture
Basic skills assessment	Skill gap analysis/pretest and test-out features
Course delivery	Profiling and mapping of personalized learning paths
Integration of third-party content	Content assembly and authoring tools
Limited interoperability with other vendors	Compliance with industry standards
Reporting of course completion	Knowledge and content management capabilities

As well as the platform tool, an authoring tool is also an important component of e-learning. Xtreamer is an authoring tool of GTKnet that integrates streaming video with PowerPoint to create Web-based content that can be viewed using Internet Explorer. Xtreamer offers clients a fast and easy way of building a library of Internet-enabled courses. There are many authoring tools on the market, especially in the US market. However, HR professionals usually need simple solutions. They are not usually professional designers or developers of courseware. As a result, the streaming authoring tool is very popular in Taiwan.

Content

According to an IDC report, there are several trends within the training content market:
- Quality content is easy to find in the USA.
- The off-the-shelf/customized mix is stable.
- An organization's own content is very important.

Corporations acquire content via three different ways:
-       39% off-the-shelf content;
-       37% in-house development by the corporation itself; and
-       24% outsourcing for customization.

Ready-made Web-based material is available from GTKnet. Our access to quality content through Commonwealth Publishing Inc. allows us to jump-start our clients' collection of Web-based material. More than 120 ready-made materials ranging from management to IT courses have been proven to reduce our clients' effort in building a balanced portfolio of Web-based content. Custom-made content is also available from GTKnet. Many clients with little understanding of how to apply multimedia technologies to Web-based material choose to outsource content development. Our team of trained experts consults, designs, and builds Web-based courses that fit our clients' needs.

GTKnet's procedure for content development is based on eight steps: define, design, develop, produce, test, publish, deploy, and maintain. In addition, we follow the digital content development philosophy: affordable, accessible, durable, reusable, adaptable, and interoperable. To provide good-quality content using this methodology, we use project managers, instructional designers, subject experts, interface designers, art designers, programmers, and photographers.

Compliance with international standards is increasingly important. There are several different standards and versions:
-       AICC (Aviation Industry CBT Committee)Content interface specifications that allow an LMS to communicate and track results
-       IMS (Global Consortium).Metadata for content, open specifications for locating and using content, tracking learner progress, reporting learner performance, and exchanging student records.
-       SCORM (Shareable Courseware Object Reference Model)

Specification provides a common technical framework for the creation of reusable learning content as "instructional objects."

SCORM is based on AICC and IMS specifications and advances the use of XML. The SCORM standard will almost certainly become the most dominant standard in the e-learning industry, and GTKnet follows the SCORM standard to develop both content and platform.

Deploying methodology

Tools and content are all-important to e-learning. However, many implementations fail even when a lot of money has been spent on tools and content. The reason is usually the lack of a deployment methodology and strategy. An e-learning implementation is not just about tool application. It has a close relationship to the corporate culture, workflow, and employee needs. Above all, a top manager's support for the allocation of all the required resources is needed. With a top-down driving force, it is much easier to implement the change management process.

There are several steps to the implementation of e-learning:
1.   Get excited.
2.   Become educated (awareness).
3.   Assess infrastructure.
4.   Create strategy.
5.   Create a business case.
6.   Solicit funding.
7.   Create contextual RFP for vendor.
8.   Analyze vendor capabilities.
9.   Begin the e-learning project.

To begin an e-learning project, there are three implementation cycles: plan, build, and operate. We need the following people, process, and technology for each cycle:
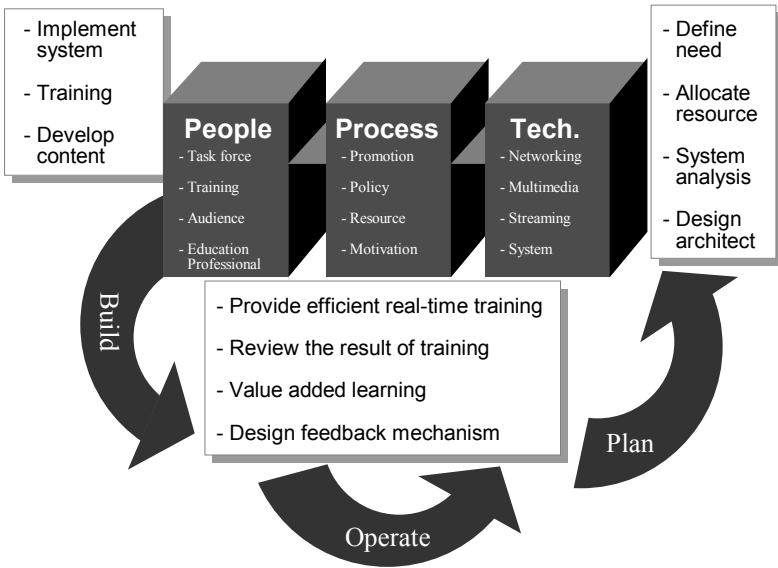
The GTKnet Philosophy

Most e-learning providers see their products (the platform, author-ing tool, or content) as their e-learning solution and core service. At GTKnet, we believe our responsibility as a total solutions provider is building a complete e-learning environment for our customers. The software is just a means to an end. The following outlines the core competencies of an e-learning total solutions provider.

Analyzing and defining a tailor-made e-learning structure
The e-learning environment must consist of software, hardware, and people. In defining an e-learning structure that will work for a prospective customer, we must first consider its corporate culture. Whereas most e-learning providers sell their platforms and believe that they have completed the job, at GTKnet we believe we have only started.

Communicating and designing the transition from traditional to Web-based training
In the business world of the 21st century, change has become

almost the only constant. We can not reverse the need for incorporating e-learning into company training; it is inevitable. However GTKnet can make this a pleasant experience for companies and their employees. Since we spend time understanding our clients, we are able to design a transition process that suits the company culture; our commitment to communication throughout the process ensures a seamless transition.

Designing the administrative process for e-learning
e-Learning, as efficient as it is, still requires some administration. It is part of our job to design a system in which companies achieve results with minimal administrative work. In other words, we make Web-based training work for the HRs department, not against it.

Designing Web-based training material
There are many subtle but crucial differences between traditional and Web-based training material. Without proper design, Web-based training can be ineffective. Worse, it can have a negative impact on corporate efficiency and waste limited resources. Our content development team consults closely with clients to create Web-based training material that is cost-effective and easy to learn from.

Planning and designing Web-based training activities
Just because there is material on the server does not mean that people are learning from it. How can a company instill good Web learning habits in its employees? What can we do to motivate their learning? Many companies do not realize the importance of this question. At GTKnet, we ask these questions and provide customers with total solutions.

To conclude, I would like to quote Allison Dollar's words: "...we are in the middle of a technological and artistic revolution. The digital world is here... and while industry pundits and analysts might have an idea of things to come... repeat this after me: "Nobody really knows a damn thing."

4. E-LEARNING TECHNOLOGY AND ITS APPLICATION: THE NEW ERA OF E-LEARNING AND LEARNING CONTENT MANAGEMENT SYSTEMS

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Introduction

The bursting of the Internet bubble has created some time for people to rethink how the Internet can be used to enhance productivity and the quality of life as a whole. A similar rethinking is happening within the e-learning industry. Traditionally, educational resources have been scarce and learning has been centered on the availability of educators, instead of learners. This classroom-based training model has long been the backbone of the learning process. To date, the development of e-learning has been centered on the same classroom training model. However, with progress in Internet technology it is now clear that the scarcity of learning resources is a problem that has been largely solved.

Market researcher International Data Corporation (IDC), a leading provider of technology intelligence, industry analysis, and market data, recently published estimates that the corporate outsourcing market for e-learning will exceed US$11 billion by 2003 in the USA. This represents an average annual growth rate of nearly 80%. This figure does not include the amount of e-learning development being done internally by corporations, academia, or government agencies. The IDC analysis cited convenience, effectiveness, and ability to target content dynamically as key contributors to the growth of e-learning. Its most strategic benefit, according to the

IDC, is decreasing the amount of time it takes employees to become productive.

According to the same IDC report, the corporate e-learning market in the Asia-Pacific region is expected to be worth almost US$233 million by 2005, growing at an annual rate of 25%. The Singapore market is expected to be valued at US$27.56 million, growing at a rate of 18%. The People's Republic of China market is expected to reach US$37 million, growing by 41%annually. The market in the Republic of Korea is expected to be worth US$51 million, growing at a rate of 31%, while that in Australia is anticipated to be worth US$65 million, with a growth rate of 22%.

We are thus entering a new era of learning opened up by the power of the Internet. The learning process will not just be centered on the classroom model but will based on a more proactive approach in accordance with the learner's individual needs.

The Traditional Learning Model

Prior to discussing the new learning model, it is useful to examine the traditional learning model (the classroom-based model). Key characteristics of traditional learning can be summarized as follows.

Prescribed approach: Traditional learning relies upon a predetermined curriculum. The learning process and learners' needs are forecast and prescribed in advance. This approach can be effective in fulfilling basic learning needs. However, the relevance of the prescribed learning process becomes less as the curriculum progresses to more advanced levels. Its lack of flexibility means it also becomes increasingly difficult to meet the needs of a volatile economic and business environment.

Top-down approach: The prescribed approach to curriculum is traditionally implemented using a top-down process in the classroom. Interaction between learner and educator is limited and to a large extent prescribed by the curriculum.

Learning as an event: The traditional classroom model has treated as

learning as an "event." Learning tasks are predetermined, delivered at a particular time, and generally static. This model can be effective for training in simple, predictable, and repetitive tasks but the process is less appropriate for more demanding and complex tasks.

Learning Management Systems (LMS)

The rise of the Internet has provided the traditional learning model with a new delivery process, which is generally categorized as e-learning. A learning management system (LMS) is a platform that enables the e-learning process. An LMS is concerned with management and monitoring of learning processes (for example, student tracking, "class" scheduling, curriculum management, etc.). The main purpose of an LMS is to provide traditional classroom training structures in a more efficient fashion using the functionality of the Internet. There are, however, a number of limitations to many LMS. These include:

-   *Use of generic content:*
    Content is often prepared using "off-the-shelf" components. The content does not necessarily address the specific needs of the leaner or the organization. Content is mostly prescribed in a similar way to the traditional education and learning model.
-   *The content authoring process:*
    Creation of customized content often requires high levels of programming skill and knowledge. The authoring tools within LMS are designed for professional users working on a specific project basis. Given the complexity of the content creation process, reusability of content is difficult.
-   *Delivery mechanisms:*
    The delivery mechanisms provided in LMS are related to the end-user's needs, as predetermined by the LMS vendors. The mechanisms for delivery of content are generally inflexible. Multiple delivery formats require complex programming processes and these are generally not available within the LMS.

It is evident that the thinking behind most LMS adheres closely to

the traditional classroom training model. It relies heavily on "content" instead of learning objects and activities. The LMS simply provides a more efficient delivery process using the Internet. While this adds some value to the traditional learning or training model, it pays little regard to the real need for a new training/learning model inspired by the rapidly changing business environment rather than by tradition.

Learning Content Management Systems

A learning content management system (LCMS) is defined as a system that enables the creation, storage, management, and deployment of learning content to serve the needs of individual learners. The emergence of LCMS resulted from the identification of the weaknesses of LMSystems. An LMS provides cost-efficient learning management and can automate the traditionally time-consuming and labor-intensive process of providing a learning context. However, an LCMS shifts the focus to the management and delivery of content that the learner needs, when she/he needs it. Most importantly, an LCMS also ensures the integrity of content from creation to storage and delivery.

Key characteristics of a good LCMS are:
-       use of learning objects;
-       interoperability and reusability;
-       based on XML standards;
-       use of standard metadata defined by learning standards bodies;
-       focus on instructional content;
-       central repository for object storage and management;
-       adherence to industry standards, such as SCORM, to ensure system interoperability;
-       flexible authoring capabilities;
-       dynamic assembly of content;
-       open database structure; and
-       multiple deployment of content formats.

LCMS take a bottom-up approach, as opposed to the LMS top-down approaches. LCMS ensure that the learning process can be

carefully managed and adherence to individual needs can be monitored during the learning process. Given the above, the components of a Learning Content Management System are shown in the following graphic.
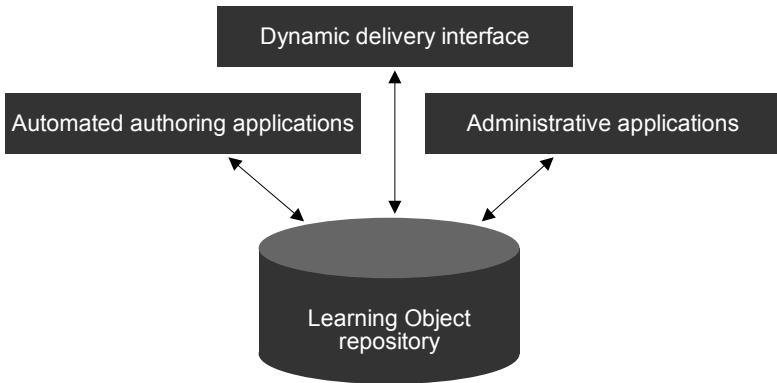
Benefits of LCMS

An LCMS is not simply an e-learning platform. It facilitates communication with all audiences in the organization through facilitation of effective learning experiences. An LCMS can benefit a corporation in the following ways.

Learning at the context level: An LCMS selects the learning objects in a sequence determined by the learner's and the organization's needs (such as job role, prior experience, or results from a preassessment task). This approach ensures that learning can be precisely targeted to the learner's needs. The most exciting feature of an LCMS is the "search learning" function, which allows users to meet their required information needs immediately.

Using one application for disparate learning audiences: The benefit of a corporation having a central enterprise-level repository of learning objects is that certain objects can be applicable to different audiences. For example, software engineers may create training content for the sales and marketing department, which can subsequently be used to create brochures and online demonstrations for resellers and customers. An LCMS adds value in ensuring consistency and streng-

thens the efficiency of enterprise knowledge flow. Since an LCMS is built upon XML technology, it becomes much easier to automate translation from e-learning to other forms of structured knowledge. An LCMS acts as a single source that can be leveraged by a corporation to create, manage, and update content for a range of learning events rather than putting resources into separate, poorly coordinated development efforts.

An LCMS is future-proofing: With XML technology, an LCMS separates content from presentation. The content can be reused with different delivery strategies. This separation allows authors to update content without needing complex programming skills. In turn, this enhances the efficiency of the knowledge flow value chain. The adoption of international standards such as SCORM, AICC, etc. also ensures the exchangeability (interoperability) of content through different systems.

Increasing corporate knowledge and performance: Massive amounts of corporate knowledge have not been effectively utilized to enhance corporate competitiveness because the knowledge has been accumulated in inaccessible legacy and proprietary formats. An LCMS can facilitate conversion of this corporate knowledge into more accessible formats in a cost-effective fashion. LCMSs also allow enterprises to develop new e-learning courses rapidly using existing classroom-based content while updating and modifying only the content that needs to be updated.

Consistency of learning on a global basis: Centralizing learning object management using a single repository ensures that organizations can deliver a consistent message to disparate audiences. While centralization can potentially lead to inflexibility and rigidity, an the LCMS authoring application and dynamic delivery interface mitigate the problem by allowing customization and localization, which in turn will increase learner involvement and retention. For example, when a multinational corporation changes some functions of a best-selling product, it will normally require a massive communication effort through internal as well as external distributors to implement the change. With an LCMS, its automated authoring applications, and dynamic delivery interface, the changes

can be quickly communicated throughout the organization. At the same time, the process can ensure that the material and the quality of the learning experience will be consistent.

*LCMS*s act as a bridge linking knowledge management and e-learning: Knowledge management is defined as a process that encapsulates an enterprise's organizational processes, people, and technology and enables the development of solutions that leverage the relationships between these components to collect and share the right information with the right people at the right time. The four key components in the process are: content management, learning, expertise tracking, and collaboration. An LCMS can contribute to these respective components as follows:

- Content Management: A process of converting, collec-ting, organizing, and sharing the intellectual assets of an enterprise in one location in the form of a learning object repository is essential to ensuring that the knowledge flowing throughout the organization is captured effi-ciently. This prevents an enterprise knowledge gap due to staff turnover.
- Learning: The "just-in-time, just-enough" learning deliv-ery offered through an LCMS is clearly beneficial to an organization's knowledge management program.
- Expertise tracking: An LCMS can assist learners to locate the content authors, which benefits enterprises by tracking expertise and linking it to the audience in a highly efficient way.
- Collaboration: LCMaSs facilitate formal and informal interactions across the organization. The open archi-tecture of XML technology supports knowledge sharing across disparate systems.

LCMSs bridge the gap between knowledge management and e-learning. The efficiencies provided through an LCMS (e.g., learn-ing content reusability, mobility, and convertibility) make an LCMS an ideal component of an enterprise-scale knowledge management system.

Technology Standards

LCMS infrastructure needs to be based on appropriate international standards for distributed content repository systems, repositories of learning objects, and e-learning transaction systems, particularly those recently developed by IEEE/IMS and Advanced Distributed Learning (ADL) of SCORM.

The ADL Initiative
While the concept of interoperable learning objects is not new, a group of organizations supporting current efforts to develop a set of standards for implementation have been organized by the US Department of Defense (DoD) and the White House Office of Science and Technology Policy (OSTP). In 1997, these two organizations launched the ADL Initiative to accelerate large-scale development of innovative learning methods to meet the needs of the military as well as the nation's commercial workforce. The goal has been to maximize human performance and effectiveness through advanced learning technologies while simultaneously reducing development and delivery costs.

To accomplish the mission, the DoD established the ADL Co-Laboratory (Co-Lab) in Alexandria, Virginia, in 1999. Its charter is to integrate the progress being made in the fields of knowledge management, e-learning, and performance support and to foster "research, development, and assessment of common tools, standards, content, and guidelines."

SCORM
To achieve its objectives, the ADL Initiative has been integrating the disparate efforts of numerous organizations and standards bodies that have been working on different but highly related aspects of advanced learning methods and technologies. SCORM is a set of guidelines composed of interrelated specifications for technologies and practices that, when implemented consistently by technology vendors, content owners, and content users, will achieve the goals of the ADL Initiative. These standards describe the necessary conditions for content created by different organizations to be interoperable with delivery systems created by different

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technology companies. (See http://www.adlnet.org/ for a more detailed description of SCORM.)

In the process of creating the evolving SCORM standard, the ADL Initiative is working closely with international standards bodies that play an important role in the development and implementation of advanced learning practices. These include but are not limited to the:
-        Alliance of Remote Instructional Authoring & Distri-bution Networks for Europe (ARIADNE);
-        AICC;
-        IEEE Learning Technology Standards Committee (IEEE LTSC); and
-        IMS Global Learning Consortium, Inc.)

About LearningXP

LearningXP is an LCMS developed with pure XML technology. It is compliant with international standards such as SCORM, IMS, and IEEE.
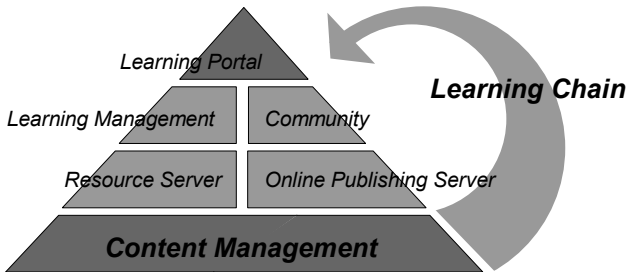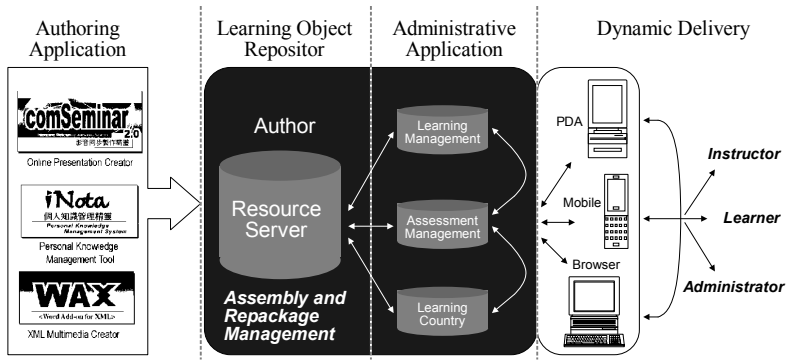
LearningXP is composed of six main functions: content management, resource server, online publishing server, LMS, community and learning portal.

Content Management
The content management function in LearningXP offers authors the ability to create their own content and to meet different needs via highly automated authoring applications. Major authoring tools include the following.

Word add-on XML:
Word add-on XML (WAX) is an add-on application for Microsoft Word. Users can create their content using Word, the most prevailing word processor program, and benefit from the highly automated functionality of WAX, which will format the Word document file with XML tags.

comSeminar:
comSeminar is an online presentation authoring tool, which combines PowerPoint with real video presentations through streaming. This application offers authors the capacity to create online presentation courses on the Internet.

iNota:
iNota is a personal knowledge management system that enables users to extract information directly from Web sites and save it in personal files via drag-and-drop. All information is saved under a tree structure, which facilitates information retrieval. In addition, the saved files can be formatted as XML for reusability.

Resource server:
Upon completion of learning object creation, all learning objects and content are stored in a native XML server, which enables content reusability as well as sharing. The resource server in LearningXP is the resource management system, which serves as a learning object repository , i.e., a centralized database in which learning objects are stored. It is from this point that individual learning objects are delivered to learners or used as components for the development of large-scale learning courses. The same object

may be used as many times and for as many purposes as appropriate. The integrity of the content is secure regardless of the platform selected for delivery.

Online publishing server:
The online publishing server can be used for customization of delivery formats as appropriate. Given the extensibility of XML, publishing formats can be CD-ROM, PDA, browser, e-Book, etc.

LMS
The LMS includes membership management, assessment systems, linked-related sources of information, and tracking of connections between learners, educators, and authors.

Learning portal:
The learning portal offers enterprises the ability to establish Web sites in a highly automatic and cost-effective fashion without relying heavily on complex programming or external system integration service providers.

Barriers and Progress in Achieving Integrated Human Capital Development and Management

Some of the most significant barriers to the evolution of integrated human capital development and management have to do with mindset and the recent history of management theory. First and foremost, most enterprises have not had the leadership or resources to link human capital issues to business problems. For old-style HR departments and back-office training units, professional development of human capital was a limited or "nice-to-have" set of processes with little or no explicit connection to fundamental business imperatives.

Second, even when training became more "front-office oriented," it tended to be pursued in disconnected pieces such as a quality initiative, knowledge management, or leadership development initiatives, all of which are well intentioned but lacking optimal impact and without the connection to an overall strategy of people, skills, and business outcomes. This fragmentation existed even

more painfully in boundaries between "us" and "them." With multiple disconnected human capital initiatives and programs, but no integration among them or activities beyond their own boundaries, business processes related to human capital were not well mapped across units or across the boundaries of enterprises. Infrastructure, or the lack of it, contributed to this fragmentation. Data and information on people's skills and capabilities similarly reside in islands and are difficult for managers to analyze and act on.

The rise of the Internet has provided a major opportunity for easy and more seamless connection. Without standards in place, the necessary applications for elements like learning, performance, content, and resource management have been difficult to bring together. Also, prior to the rise of the Internet, there was little consciousness or capacity of enterprises to empower their knowledge workers with easy "self-service" tracking of their own development and growth opportunities. Fortunately, the situation is steadily improving as more enterprises realize the importance of managing people and their knowledge strategically. Leading-edge HR practices and learning organizations are helping to pace the change in many enterprises; in other cases, senior and line executives are taking responsibility for promoting human capital development and management as a mission-critical priority. Additionally, new infrastructure that leverages emerging technical and content standards is becoming available.

Conclusions

LCMSs, with their focus on learners, are a breakthrough in e-learning. The concept delivers on the Internet's promise of providing what is really needed, when it is needed, and how it is needed. LCMSs are the second wave of e-learning and can be expected to change the landscape of e-learning forever. Most importantly, LCMSs provide wider benefits by linking enterprise knowledge to enterprise competitiveness. Enterprises should be encouraged to take advantage of LCMSs as a business opportunity. The uptake of LCMS systems will help to shape the business leaders in the new economy.
The LearningXP vision is to make it possible for every enterprise to

manage its human capital efficiently and effectively. It can do this by bringing together learning, performance, and content and re-source management through a holistic, seamless set of integrated business processes and information dissemination processes en-abled by its globally scalable infrastructure.

5.   EDUCITIES

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Unity is Strength

In the Internet era, our entire society is facing dramatic changes. Education is part of this change. We need to question the future path of education. The "EduCity" concept is a model for that future. It has arisen from the persistent vision of a group of scholars with great enthusiasm for education. The learning models upon which the EduCities initiative is based arose from a study of Internet communities.

The developers have committed themselves to developing a learning technology that focuses on the provision of services to people and enhances the humanity and care components of education. The development was first funded by the National Science Council of Taiwan and subsequently upgraded to a research project with the support of the Ministry of Education. This vision for online education became a reality with the announcement and promotion of EduCities i January 2000. Dr. Lee Yuan-tseh, President of Academia Sinica, is the honorary mayor of EduCities and the Minister of Education is the city advisor. The development, continued survival, and growth of EduCities relies on the support and guidance of:
-        the leading thinkers in our society;
-        the continuous innovative research of many universities;
-        government authorities;
-        sponsorship from many public and private corporations; and
-        the enthusiastic participation of civic groups.

Active Learning

EduCities is the first Internet educational city of its kind. Based on the metaphor of a city, EduCities is an online educational environment responsive to the needs of the real world. It connects people and current education programs and is based on the principle of "active social learning." Education is the mission of EduCities. EduCities uses the interest and stimulus of information technology (IT) to provide incentives to learners. EduCities encourages a spirit of active learning and ultimately aims to build active communities of lifelong learners.

EduCities is an open online educational platform. It uses IT to overcome barriers to the dissemination of knowledge. Knowledge and education are no longer intangible assets available only to those who have had access to formal schooling. The linking of educational institutions and their communities, the booming interest in the Internet and related technologies, and the open online educational resources of EduCities will ensure that knowledge and education are no longer the privilege of a minority.

EduCities is committed to developing and supporting a range of approaches to learning and instruction and providing them freely to users. It allows the stakeholders in education (scholars, teachers, parents, and students) to create and share online educational resources. By appropriately organizing and combining the resources, the learners can widen and deepen their knowledge. EduCities represents a mechanism through which we can realize the goal of knowledge diffusion and have all members of our society enjoy one of the real benefits of the IT age.

Features of EduCities

Confucius House: Confucius House is an online space for a community of teachers to interact. The challenges for teachers in the "e-generation" are great. They need to know, understand, and implement the processes of education reform. They need to stay abreast of the latest information and communication technologies and they need to acquire the skills to integrate IT into educational

and instructional activities. EduCities established the Confucius House to assist teachers to meet these challenges. Through systematic management and application, Confucius House provides a powerful tool to help teachers integrate IT into classroom instruction. Confucius House gives teachers everything they need to design and conduct successful teaching activities. It contains eight subsystems:

- Exchange Center for Instructional Design;
- Center of School-based Curriculum Development;
- Exchange Center of Instructional Materials;
- Exchange Center of Items;
- Academy for Teachers;
- Teacher Association;
- Web Journals for Teachers; and
- WebTV Station for Teachers

The Exchange Center for Instructional Design in Confucius House provides teachers with a tool for developing lesson plans online. While they are designing their plans, teachers can import instructional materials from the Exchange Center of Instructional Materials, another subsystem of Confucius House. For class evaluations, they can also import test items from the Exchange Center of Items and use them in their evaluation activities. The whole process resembles the "Mongolian barbecue": all you do is selectp the uncooked food of your choice (the teaching materials and test items) and leave the actual cooking to a professional chef. The only difference here is that the professional chef is the teacher.

The Teacher Association is a regular, organized face-to-face communication activity ("bricks-and-mortar" organization) in which teachers share their common interests in the application of IT to education. Through thephysical meetings and teaching demonstrations, the teachers exchange instructional ideas with each other. Teachers who are very actively engaged in sharing their teaching experiences can give online lectures in the Academy for Teachers. On special occasions, teachers can even video their onsite teaching and Webcast the video stream to the public with the help of the WebTV Station for Teachers. Through the Teacher Association, experienced teachers can support the less experienced. Through

their mutual interaction, an autonomous learning community of teachers can develop.

When teachers are able to publish their lesson plans and resources online, the plans and resources have the potential to become disorganized and the quality may vary. To address this issue, Confucius House established a Web Journal for Teachers. Like other prestigious academic periodicals, teachers can submit their lesson plans, materials, or resource evaluations to the journal committee. After review and approval by the journal committee, these materials are published in the journal so that excellent work can be appreciated and adopted widely. Teachers looking for resources can find them through this journal more efficiently since the materials have been carefully screened and reviewed by the committee.

Once the majority of schoolteachers are using the Exchange Center for Instructional Design to develop and share their lesson plans, there will be increased potential for the development of school-based curriculum. The Center of School-based Curriculum Development can provide the schools' decision-makers (usually the principals or curriculum development committees) with a monitoring and decision-making platform. On the platform, the decision-makers can review the deployment of human resources in their school and the areas of expertise of their teachers. They can review the appropriateness of lesson plans (for example, find which instructional topics are repeated across the curriculum) and examine the personal performance index and learning history of students. With this platform, the schools can review their curriculum design processes and outcomes and develop their own unique curriculum features to fulfill the spirit of school-based curriculum.

EduTowns, an open online community-building platform:
Through the open online community-building platform of Edu-Towns, it becomes easy for schools to:
-        build Web sites that reflect their distinguishing features;
-        realize the vision of "Web sites for all classes"; and
-        provide "digital study rooms for all individuals."

EduTowns is an information system based on the operational model of a school. Each participating school represents an EduTown. Under each EduTown, there are many EduVillages, representing the classes within a school system. Each student in a participating class is both a member of an EduVillage (class) as well as an EduTown (school). In addition, there are EduCitizens, representing each participating individual in the class. Each EduCitizen creates a personal learning Web site. The future will see the development of EduFamilies to complete and integrate the entire system.

EduTowns are in fact mini EduCities within each school, providing functions tailored to each school's needs. As each EduTown is being built, the mayor of the EduTown can select the "services" to be provided (that is, the educational/instructional software required to provide the selected services). Like EduCities, EduTowns are also an open, online community-building platforms with the distinguishing feature of a "this-town-only" specialty thatallows each school to upload its own Web site and integrate with the EduTowns system. The content and services of each participating EduTown are the summation of the school's unique Web-based services and those of the EduTowns system.

Currently, there are approximately 1,700 participating schools in EduTowns, and more than 9,000 EduVillages have been built, with 50,000 EduCitizens in total. The concept of EduTowns is to provide an interesting, convenient, and interactive learning platform for school learners and save the time that would be spent on the local development of platforms and underpinning technologies. Tailored to each school's needs, EduTowns can not only help develop the Web sites that represent the individual features of participating schools but also provide a powerful interactive learning platform.

EduAlliance
While initially based in Taiwan, it is planned to promote the learning technology of EduCities to the world through the EduAlliance. The vision of the EduAlliance is to:
- position Taiwan as a hub of the world's online learning community;

- establish Taiwan as a role model of international educa-tion reform; and
- enable Taiwan to take a leadership position in the future development of learning technologies.

The EduCities Web site will ultimately expand and become the International EduCities Alliance, implementing the latest learning technologies, aligned with the world's top educational institutions, and establishing communities of learners which unite teachers and students with different cultural backgrounds.

History of EduCities

2000
01/05	Grand opening
02/25	EduClasses commencement activities
03/30	EduCities launched environment capital pro-motion campaign
04/12	First cooperation with public TV
04/20	EduCities announced the best cyber science fiction
05/01	Second cooperation with public TV
06/18	The First Cyber Science Fair
09/21	EduCities launched fire prevention campaign
09/30	The Joint Conference of Internet Influences on Education and Applications of IT in Education of High School and Elementary School
10/01	The second EduClasses course-offering contest
10/16	EduCities idea-train activities
10/28	Opinion poll on changes of look of EduCities Web site
11/13	The opening of EduCities Theme Park
12/05	EduCities and Taipei City became sister cities

2001
01/13	EduCities anniversary celebration
01/13	Launching of EduTowns
03/13	Launching of EduIslands

03/23	National Seminar on High School and Elementary School IT Education
03/28	The second phase of EduCities Theme Park construction s
03/29	Construction of Confucius House
05/03	Teachers-Educators Discussion of High School & Elementary School IT Education
05/04	High School & Elementary School IT Education Summit
05/25	Fifth Global Chinese Conference on Computers in Education
06/15	The second EduCities Cyber Science Fair
07/18	New Web-mail account system launched
09/25	Opening of EduObservatory
10/18	EduClasses-CITIBANK Finance Management Lecture (courtesy of CITIBANK)
10/22	The third EduClasses started
11/09	The third phase of EduCities Theme Park construction
11/17	Cooperation with the magazine Common Wealth
12/09	Participated in the Lifetime Learning Fair sponsored by the Taipei Education Bureau
	Chosen as the BEST 200 Education Web Sites by Common Wealth and Taiwan's Six Biggest Community Web Site by Digital Weekly

1. FIJI (1)

Christine Kean
Teleom Fiji Ltd.
c/o Private Mail Bag
Suva

The Role of Telecom Fiji Limited

Telecom Fiji Limited is responsible for the development, operation, and maintenance of telecommunications services throughout Fiji. These services are designed to meet social, commercial, and industrial needs and intended to be available throughout the country as far as reasonably practicable. The government has the exclusive privilege of establishing, maintaining, and operating telecommunications within Fiji. To a large extent, this privilege has been conferred upon Telecom Fiji Limited. The granting of an almost virtual monopoly to the company carries with it a responsibility to exercise that monopoly in the best interest of the public and in accordance with government policies. The company operates on commercial basis under the Posts and Telecommunications Trust Account Act 1973, which specified the purpose for which revenues earned by the company may be used. Revenues must cover current expenses each year and provide not less than 60% of capital funds required for development. Funds are also obtained from external sources in the form of long-term loans on commercial basis.

Telecommunications Industry Structure

The telecommunications industry structure in Fiji can be thought of as a three-level structure with the Ministry of Communication at the top overseeing all telecommunications activities. The Telecommunication Regulatory Unit regulates, monitors, and controls all telecommunications operations. There are three main telecomunications operators: Telecom Fiji Limited, Fiji International Telecom-

munication Limited (FINTEL), and Vodafone Fiji Limited.

Telecom Fiji
Telecom Fiji is the sole national carrier and is owned by Amalgamated Telecom Holdings (ATH) which is 51% owned by the Fiji National Provident Fund (FNPF) and the government (49%).

FINTEL
FINTEL is the international carrier and operates the only international gateway exchange in Fiji. FINTEL is 51 % owned by the government and the remaining 49% is owned by Cable & Wireless (UK).

Internet Services

Internet services were officially launched through Telecom Fiji in November 1995, for a trial period of six months to gauge commercial viability. The official launch period for commercial use was in August 1996. The charge for Internet services has varied over the years. It has decreased from 27.5 cents per minute to a flat rate of $49.50 per month for a special package. Currently, the Internet bandwidth in Fiji is 4 Mbps and dial-up is up to 56kbps. Estimates from Telecom Fiji indicate that the number of users has increased from 1,000 in 1996 to more than 24,000 in 2001. Of these customers, 60% are residential and 40% are business or corporate.

Difficulties in Setting Up Internet Services in Fiji

There were two main problems in establishing Internet services. The first was the high international bandwidth charges, which make the product expensive for the customers wanting access to the Internet. The second problem was the cost and number of computers. Computers are considered a luxury item in Fiji, and one unit can cost nearly US$3,000.

e-Learning

e-Learning in Fiji is a fairly new concept. At the moment, it is only used by the University of the South Pacific and Central Queensland University. Some courses are online to other South Pacific nations like the Solomon Islands, Tonga, and Samoa so the students can "attend" lectures using the technology of e-learning.

Some corporate organizations also use e-learning but it is initiated by their parent company, which in most cases is abroad. One example is the banking industry. The ANZ bank provides some online training from the Melbourne head office to staff in Fiji. Because of the expensive infrastructure involved and the high cost of accessing the Internet not many training institutions have opted to use e-learning as a means of communicating to their students. The old-fashioned method of teachers lecturing and the student classroom scenario is still the preferred model for education and training.

e-Learning Advantages

e-Learning in Fiji has the potential to be a convenient and satisfying way to give training across to students in an inexpensive manner. With the geographical spread of the country, it is clear that the costs associated with traveling to a training center will be reduced immensely. Students will have a more convenient way to continue their education and access the highest quality of education and training from around the world. A further advantage is a reduction in the need for centralized investment in the main education and training infrastructure. Finally, the method of e-mailing feedback would allow students to stay in contact with their lecturers and trainers.

e-Learning Challenges

Educators and trainers will need training and familiarization with the technologies involved in e-learning. Organizational policies are needed to support students and programs to educate them in the use of e-learning. In Fiji only a small percentage of schools have access

to computers and if there are units for use they are usually small in number, again limiting access to the technology. There needs to be a conscious move toward supporting e-learning as a means of learning in the country and this is likely to be five to 10 years in the future.

Impact on Proffessional Development of Trainers

At this time it is unlikely that e-learning will have a major effect on the professional development of educators and trainers in Fiji, at least not for the next five years. However, once the technology is adopted for training, it will improve the quality of education. It will also increase the quality of information and knowledge available through the institutions in the country.

2.   FIJI (2)

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Introduction

The Internet and intranets offer a wide range of alternatives for the delivery of training and education. e-Learning is an example of this type of training or education. It can be defined as online training that can be either instructor led or self paced. Recently, e-learning has occupied a prime place in discussions about improving training and education worldwide. A number of organizations and individuals around the globe are enhancing education and training using e-learning, and Fiji is no exception.

Fiji can be classified as a relatively small and developing nation, which has just begun diverting its economic resources into the information technology (IT) arena. International studies suggest that Fiji is in the early stages of developing its IT-related strategies and policies. Generally, IT awareness and training are still limited, although there are signs of improvements in this area. Currently, there are around 23,000 Internet users in Fiji, which represents around 3% of the population. In coming years, it is expected that this percentage will increase substantially, mainly through the initiatives of government and education institutions.

**Awareness of and Training in the Internet and
Online Technologies**

Fiji's educational system places an emphasis on IT and computer literacy at the secondary and tertiary levels. In the education sector,

while the students have basic computer literacy, the Internet and other online technologies are not utilized to a great extent. Online technologies are restricted to certain sessions at secondary schools.

A number of tertiary institutions offer computer- and IT-related training for the development of Fiji's human resources base. They include the University of the South Pacific (USP), Central Queensland University (CQU) Fiji International Campus, Fiji Institute of Technology (FIT), and College of Higher Education and New Zealand Pacific Educational Centre (NZPTC). Except for CQU, the other tertiary institutes have Internet access limitations. This is because of the limited number of computers available in relation to the number of students, the high Internet access charges, and the long downloading times. A number of corporate organizations are also connected to Internet, primarily for cost-effective communication purposes, but the access is limited to certain levels or designations in the organization.

The government Information Technology Centre (ITC) runs the government's intranet. Almost all government departments have some access to the Internet and related services provided by the ITC. The ITC also conducts in-house training for civil servants. Access to the Internet and intranet for the civil servants is again restricted to certain designations and duties. There remains a lot to be done in terms of creating awareness about the role of the Internet and other online technologies in facilitating education and training at secondary and tertiary levels as well as at workplaces in the public and private sectors. It would not be an overstatement to define Fiji as the IT hub of the South Pacific. However, it would be an overstatement to say that IT and e-learning awareness exists at a high level in Fiji. While such awareness exidts at organization level, it has yet to filter down to the greater population.

Government Policies and Reports on Internet and Online Technologies

The Government of Fiji has realized the importance of the Internet and online technologies and Fiji's first Information Technology Advisory Council was set up in 2001 with representatives from

both the public and private sectors. On numerous occasions, the importance of access to the Internet and ITy for the people of Fiji has been stressed. Setting up the Advisory Council can be seen as one of the steps toward achieving this goal.

In February 2002, it was decided by the Cabinet Sub-Committee on Investment to develop a government policy statement on IT development. The major focus of the government policy is on the development and growth of information and communications technology (ICT) in the nation. Fiji currently lacks a clear policy direction for ICT development, although the government has identified IT as one of the priority areas for development.

e-Learning in Fiji

The awareness of e-learning is not prevalent among most of the population. However, e-learning has commenced at some tertiary institutions. The awareness is now slowly being filtered down to the other potential users of e-learning. A considerable amount of work still needs to be done to promote e-learning in Fiji before it can be used as an effective tool for education and training.

USP is one of the institutes which offers courses via multiple electronic means. The Distance Flexible Learning (DFL) initiative of USP takes this approach to deliver courses to other countries in the region and locally. Although all sections engaged in the development and delivery of courses have some responsibility for DFL at USP, University Extension (UE) holds the major responsibility. Under the directorship of Dr Richard Wah, the UE carries out DFL via e-learning. UE promotes or creates awareness of e-learning at various levels and using various modes. These include presentations and demonstrations at the University Open Day, ongoing presentations and orientation, and training for students, members of staff, and other interested institutions that are willing to pursue e-learning (for example the Fiji School of Medicine and World Health Organization). Recently the "little fire" approach has also been used for awareness and training. UE has also commenced projects with other institutions/organizations to develop and deliver their courses via electronic means (for example, currently UE is

working to develop and run nursing courses via e-learning for potential nurses from the region).

Currently at USP, approximately 15 courses are being taught via e-learning each year. UE prepares a three-year strategic plan and presents this to the USP Council for its approval and funding. The last strategic plan was developed in 2000.

USP has placed a lot of emphasis on technology for distance and flexible learning since March 2000 when it upgraded and re-launched the USPNet and is still working tos better the systems. TheUSPNet covers the following 12 USP member countries: Fiji, Cook Islands, Samoa, Tonga, Niue, Tuvalu, Kiribati, Nauru, Vanuatu, Marshall Islands, Solomon Islands, and Tokelau. USP has moved from being a dual-mode institution toward multimodal.The USPNet provides support to students in the region via:
- Audio-conferencing, tutorials, and counseling;
- Audio-graphics tutorials;
- Video conferencing workshops/tutorials;
- Video broadcast workshops, tutorials, lectures, and science demonstrations;
- USP intranet access and online resources;
- Use of online platforms incorporating discussion groups, e-mail, assignments, chat rooms, etc.;
- Data transmission of banner, library, and other servers; and
- More efficient administrative processes conducted electronically.

With the intensifying of interest in e-learning the trainers, teachers, students and administrative staff at UE have adapted new methodologies and techniques. Ongoing training in different areas relating to e-learning, orientation, and presentations are organized and conducted on a regular basis to assist them to adapt to the new methodologies and techniques. These training programs are organized in all member nations.

CQU also uses e-learning to some extent to assist its students in learning. On average, CQU has one computer for every four

students and the students have full access to Internet and intranet facilities. CQU is administered centrally from CQU Rockhampton and it is also the base for the university's distance education activities. Several of the multimedia units at the Fiji campus are taught via e-learning from the Rockhampton campus. CQU may diversify its e-learning in future but the initiative/directive must come from CQU Rockhampton. All the planning process for further enhancement of e-learning will also take place at CQU Rock-hampton.

Opportunities for Development of e-Learning in Fiji

Fiji has a lot of potential in the area of IT. There exists a vibrant education sector as well as a corporate culture that is pro-IT. Through awareness creation and government initiatives, e-learning can be utilized successfully and effectively at various govern-mental, corporate, institutional, and individual levels.

In addition, Fiji can take advantage of successful collaboration between agencies. The various educational institutions, education departments, and corporate training initiatives can collaborate to provide a solid e-learning platform. Many of the problems that currently hinder e-learning initiatives can be overcome using colla-borative approaches.

Barriers to the Development of e-Learning in Fiji

The basic barrier to the provision of e-learning or any Internet-related electronic service is the cost. While the current telecommunications infrastructure handles electronic service delivery, Telecom Fiji's monopolistic position makes it difficult for the ordinary citizen to afford Internet access. There has been some public concern and deliberation on this, after which Internet access charges dropped. However, ordinary citizens are still unable to afford a connection.
There also needs to be a serious government attempt for develop-ment in this area. While there exist some government initiatives, the government itself does not have an e-government policy or strategy in place.

Other barriers include:
- There is a lack of general awareness of the potential of the Internet and e-learning.
- There is only one Internet service provider for a population of approximately 750,000. There is no competition to lower prices and improve services.
- Downloading times are long (bandwidth limitations).
- At many workplaces, training is not a priority and e-learning is seen to be more expensive than traditional classroom methods

Globalization of Education and Training

The development of e-learning has been one of the key factors behind fostering international partnerships between major universities, and Fiji is no exception. These partnerships with international universities are seen as opportunities. USP has developed partnerships with Washington, DC, to conduct a 200-level law course and a partnership with the University of Hawaii and University of Canterbury to conduct a 300-level history/politics course. Both of these courses use e-learning.

e-Learning for Productivity Promotion and Training by NPOs

In general, the use of e-learning will be of great assistance for the National Productivity Organizations (NPOs) in promoting productivity as well as providing training for increasing productivity. The key factor that needs to be considered relates to the awareness of and training in the potential of e-learning and considerations of access to the Internet and other online technologies by the individuals and organizations.

e-Learning will be beneficial to NPO officers who are charged with the responsibility of promotion and training relating to productivity. Some of these benefits include:

- Officers will have more time to visit organizations and follow up on projects and provide advice since the awareness and training will be conducted using e-learning.

(Currently, at the NPO in Fiji there are two officers responsible for the Productivity Awareness Campaign and the Fiji Quality Awards.)
-    Promotion as well as training would be able to reach a greater audience.
-    New and updated materials will be easier to disseminate.

Conclusions

There are numerous advantages associated with e-learning, such as flexibility, accessibility, convenience, cross platforms, inexpensive worldwide distribution, and ease of update. It can be used as an efficient and effective means of promoting productivity and the provision of training for increasing productivity. In Fiji's case, there needs to be greater awareness of the potential of e-learning and greater usage of the Internet and online technologies before Fiji will be ready to embark on e-learning for promotion and training in areas relating to increasing productivity.

3.   INDIA (1)

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Hundreds of languages are spoken in India. Literacy in urban areas is 80%, and rural literacy is 56%. India has 192 million illiterate women, which is nearly one-third of all illiterate women in the world. While the educational divide is wide and causes concern, traditional methods of bridging it are limited by physical and fiscal factors. The increases in numbers of teachers have tapered off from 5.6% in the 1950s to 1.6% in the 1980s. The average teacher:student ratio at primary level is 1:58 in rural regions. This will become worse if the field of education is not revolutionized using recent technologies like e-learning.

e-Learning is an emerging field in India and will go a long way to assist in managing the problems faced in the teaching process. In particular, e-learning has the capacity to secure continuous control of the learning environment and to perform student appraisals, which contribute significantly to enhancing teaching and learning effectiveness. The "e-class" concept will significantly advance the region's information technology (IT) education and training. The focus is on utilizing technology to provide better and more advanced educational systems. The concept of e-learning can provide an opportunity to introduce a higher level of practicality in education and training, forging closer links with workplaces and the practical application of learning rather than with the more theoretical content that often makes up much of traditional classroom-based learning.

The World Wide Web has given us e-commerce as a new way to

sell services and products. The Web and the Internet have also increased opportunities to communicate with a large numbers of people quickly and economically. There are numerous opportunities to use new technology to gain a larger market share and produce and distribute goods and services more effectively and efficiently.

India is investing 3.2% of its GNP in education, whereas the world average is 4.6% and developed countries invest about 5.3%. In the above context, there is a lack of general awareness of e-learning in India. However, the awareness of the Internet is catching up with that in developed countries. The Internet is now reaching up to 10 million people. This number is much more than the population of many countries and is increasing daily. The main barrier to more widespread use of the Internet and its associated technologies is bandwidth availability. However, the scene in India is encouraging in this area. Bharti Enterprises has already laid a 3500-km fiber network in 22 major towns. Railtel Corporation of India, a public-sector undertaking under the Ministry of Railways, has been formed to modernize the railway communications system. Railways have the right of way for 62,800 kilometers Tata broadband has around 600 kilometers of fiber and has plans for 5000 kilometers in 53 commercially important cities. Hughes Telecom, Spectranet, and many other companies are participating in this field. Once there is a complete network and associated bandwidth, the use of the Internet and e-leaming will definitely catch up with that of current leaders.

The State Government of Haryana is doing a lot to promote the Internet and online technologies. It has developed the IT policy 2000 which provides many facilities and benefits to companies dealing with IT and computer awareness. IT education has been made mandatory by the Haryana state government at all levels (primary, secondary, and higher education). Government employees are being given computer training and should be computer literate by the end of 2003. Special concessions are given to corporations promoting the IT industry and promoting the e-learning concept. Concessions in taxes are also being given to entrepreneurs who promote IT-enabled services like call centers in the State of Haryana. Similar policies are also being rolled out by many other states in India.

The Government of India has taken some important initiatives in this direction, some of which are summarized below:

- Sh. Parmod MahaJan, Minister, Communication and Information Technology, made an important announcement to promote IT industries by assuring them that the government will not treat successful IT companies as "milk cows."

- The Government of India has formed a committee for "IT for the masses." This committee has submitted a report, and a national IT mission has been constituted under the chairmanship of the Secretary IT, Government of India, to oversee the implementation of the "IT for the masses" recommendations.

- The Government of India is focusing on research for a "Digital Village." Its goal is to realize Mahatma Gandhi's vision of a sustainable village through culturally appropriate use of new technologies, which should not erase traditional culture but should enhance it and make it sustainable.

Our entrepreneurial society is preoccupied with proving that it produces quality products. e-Learning, with interactive Internet communication tools, is certainly an improvement over traditional distance education.

The Government of India has asked private-sector companies to make a commitment to rural areas. India is looking forward to establishing a "Universal Service Fund" to service the rural IT plan. The Government of India has slashed telephone call rates to promote the use of the Internet and make the Internet and telephone services affordable to the general public. The Ministry of IT holds regular meetings to promote the concept of e-learning. As India has already established itself as a major IT player in the world, we hope to implement this new concept of learning very rapidly. Special attention to this field has been given by the Ministry of IT because of its potential benefits.

The Massachusetts Institute of Technology and the Government of India have signed an agreement (inJune 2001) to establish Media

Lab Asia in India. Media Lab Asia has been nominated as its Technical Secretariat by the United Nations. The Government of India suggests that 3% of annual budgetary allocation should be allocated to ITy by all state governments.Many universities have developed e-learning strategies, and many others are making progress in this direction For example:

- Sikkim Manipal University has set up an e-learning center in Karnatka.
- NIIT India has established Net Varsity for e-learning.
- Aptech has an onlineuniversity.
- E-gurukul.com is a university/e-learning center.
- Pentasoft technologies, the IT software company in Chennai, is a premier company in providing e-learning solutions. It has a collaborative arrangement with Sollyhull University UK, Kazak American University, etc.
- Educomp Datamatics Ltd., an education technology and e-learning company, has launched "Planet Vidya Intranet Solution" (January 2002). This is an intranet version of its Web-based instructional content solution for schools. It will help schools to simulate an online learning environment within the school without the associated high infrastructure costs.
- MacMillan India, a publishing company, and the National Institute of Design, Ahmedabad, have collaborated in offering online design education programs through its Web site. The program is titled the "Good Design Series."
- Sanchar Dhabas, Internet-enabled information booths, will be opened in thousands of sites across the country.
- The Government of India is devising a convergence bill, which will play a vital role in reshaping of communications in the far reaches of India.

The Government of India plans to cover all villages in country with affordable telecommunications facilities by 2002. According to a survey carried by Jaylor Nelson Sofers, 13% of the adult Indian population used the Internet in December 2001 (compared with the global adult Internet user population average of 31%).

The language problem is also being tackled on many fronts. The

Microsoft XP Desktop operating system has the ability to support nine Indian languages. Modular Infotech Pvt. Ltd., a Pune (Maharastra)-based company, is actively working on the language front. It has partnered with Microsoft to develop various keyboard handlers for Indian languages.

HCL Info System Ltd. has announced the implementation of a wireless LAN solution for Amity Business School, an institution of the Ritnand Balved Education Foundation for learning management. AKSH Optifibre is in the process of providing computer education (through an optical fiber network) to all villages in a project called GRAMDOOT.

The main problems with the development of e-learning in India are:
- the diversified geographical spread;
- the use of different languages in different states and regions;
- the communication infrastructure; and
- illiteracy.

e-Learning will enhance productivity in organizations (including National Productivity Organizations) because of the increased access to information through the Internet. Communications barriers will be reduced within organizations, and decision making will be faster, more accurate, and more appropriate. Training online means employees do not have to leave their workstations, which will definitely improve productivity. e-Learning may not be a universal solutiony. It is complex and demands new understanding and new leadership. To become leaders in e-learning, we need to understand its strengths and weaknesses.

4.   INDIA (2)

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Introduction

Time, distance, and language have been traditional hurdles in the path of formal education in India. Information technology (IT) and communication and computing technologies have made available powerful tools to a large section of the population. Videoconferencing, satellite applications, the Internet and the World Wide Web (www) have started changing the lifestyles of people. These tools help overcome several barriers and have led to the setting up of digital/virtual/e-campuses or e-varsities. e-Learning is changing the education paradigm from teaching to learning. It stretches its wings from campus or classroom to home or workplace or entire community. Today, global connectivity means much more than technology and commerce; it means global learning beyond geographical boundaries.

Status of e-Learning

Online training is still a very nascent concept in India and is presently being adopted by a very small and defined learning community. The Indian online learning market scenario is currently dominated by IT training, with non-IT related training yet to establish itself. Many top IT training companies (for example, Aptech and NUT) have started offering their courses on the Internet. The e-learning concept will have an impact only if non-IT courses are offered and eagerly received. Other institutions and universities have made a beginning. Since access is restricted to only to a few segments of society, the concept of e-learning or

online training will take some time to become popular.

Government Policies and Implications

To reach the masses, it is necessary to create attractive interactive lessons both in English and local languages. It may not be possible for a substantial portion of the population to take advantage of e-lessons for lack of computers and Internet connections. For this, a large number of community computer centers should be established as "windows" for e-learning, making it possible for anyone to access them for a nominal fee. In line with this need, the Government of India has launched a program to set up computer education facilities at 60,000 schools with 10 computers per school over five years. The schools will also be provided with the following resources: free Internet access; five to 10 CDs per school with good educational material in regional languages; andtraining of two teachers per school. Serious effort in Indian language computing was started with the Department of Electronics (DoE)-sponsored symposium "Linguistic Implications of Computer Based Information Processing," in 1979, and was followed by the development of graphics and intelligence-based script technology (GIST). Development of GIST was a major breakthrough at the Indian institute of Technology, Kanpur (IITK). The Centre for Development of Advanced Computing (C-DAC) worked further on this technology. To bring all efforts under one umbrella, the DoE initiated another program "Electronic Tools for Indian Languages" (ETIL) in 1987. The DoE (now the Ministry of IT [MIT]), initiated the Technology Development for Indian Languages (TDIL) project with the objective of developing information processing tools and techniques to facilitate human-machine interaction without language barriers, to create and access multilingual knowledge resources, and to integrate them to develop innovative user products and services.

The C-DAC has done valuable work in promoting IT applications for Indian languages and developedb software products like the GIST Card, Ileap, GIST, ISM, etc. The Bureau of Indian Standards marketed the Indian Script Code for Information Interchange (IS-CII)" IS 13194: 1991 as a standard for Indian language computing. BIS also standardized the keyboard layouts for each language.

The MIT has initiated several projects for the promotion of Internet-based distance education, especially in the higher education sector and in the IT sector:

1. Virtual Campus Initiative of IGNOUOne Year Post Graduate Diploma in IT (distance education mode).

2. A centralized Web site for Internet-based Online Interactive Courseware by the IIT Delhi.

3. A Demonstration Project on Internet-based Online Interactive Courseware commenced in March 1999.

4. Internet-based Online Interactive Information Services over a Hybrid Network by the IIT Kanpur, to set up a laboratory-level hybrid Internet data broadcast/digital TV network and demonstrate an interactive classroom, digital library, and information services.

5. Design and Development of Multimedia Based Courseware by the BITS, Pilani, to design and develop multimedia based courseware that can be deployed on the Internet as part of the BITS Virtual University Project.

6. Postgraduate diploma in IT from the IITs/IISc to generate an additional 500 postgraduate diploma holders through IT-enabled distance education; to create an "Integrated Distributed Learning Environment" through 10 participating centers, each handling 50 students; and to promote and create a digital library for IT education and training and make it available through ERNET

7. The Center for Excellence in Distance Education Technology: proposed setting up a national center for excellence in distance education technology at the National Center for Software Technology (NCST), Mumbai, to provide training facilities in various tools available for online learning and provide some courses through the Internet. This center provides a platform for a range of technologies associated with online learning.

e-Learning in Government

The Ministry for Urban Development and Poverty Alleviation has announced that an e-learning project for promoting capacity building in the area of urban governance in urban local bodies would be

launched in 3,658 urban local bodies in the country. The target audience would be around 73,000 persons including municipal councillors and the officers of various municipal corporations, municipal councils, and municipalities. The most modern techniques of teaching through the Internet and other e-learning methods will be part of the program.

Examples of e-Learning

EducationThe site www.egurucool.com is one of the most talked-about and well-publicized e-learning sites in India. From Central Board of Secondary Education courses to medicine and MBAs, the site has well-researched content for the student community. It has special sections for those planning to study abroad. It also has pages for parents about various schools in different cities and interesting interviews with top students. The site provides exhaustive information and contains a huge database of sample question papers and their answers for various courses.

Schoolnet India has developed an education portal that will function as a framework for technology-enabled learning. By using the Web to impart education, it will overcome the problems of social infrastructure that most Indian schools face now. Schoolnet is formulating a number of learning programs to expand the reach of education, enhance the learning process, and catalyze continuing education through nonformal and vocational processes. The program offers schools a complete package of technology, content, and training and is implemented in a two-pronged approach, providing teachers with a powerful teaching resource and students with an interesting and motivating learning medium.

Another site, www.classteacher.com, has been developed based on the concept of Internet-driven virtual schools. The project will provide futuristic learning tools to students, teachers, and parents. Classteacher.com works in partnership with schools to provide a personalized learning module tailor-made for schoolchildren. The objective is to provide stimulating ways of learning for children and also steady feedback on their progress with individual learning graphs for parents and teachers.

There are more than 75 sites in the country today that promise to help students prepare for competitive entrance tests for admission to professional colleges. Be it medical, engineering, MBA, or MCA entrance tests, these Web sites are aiming to attract the student community to log onto their sites and prepare for the examinations. Most of these sites conduct online mock examinations.

Community Learning

On January 1, 2000, Dhar district in Madhya Pradesh began the new millennium with the installation of a-low-cost, self-sustainable, and community-owned rural intranet project. Dhar district has a population of 1.7 million, with 54% being tribal and 60% living below the poverty line. Computers in 20 village centers in five blocks of the district were wired through an intranet network (presently there are 31 such wired village centers). Local rural youth act as entrepreneurs running cybercafes/cyberoffices on commercial lines without salary or stipend. The computers in the network have been established through the Village Committees and are called information kiosks. The kiosksprovide user charge-based services to rural people.

The Gyandoot Project has established 34 kiosks at high schools and higher secondary schools and is providing local educational content through the server. The schools are also accessing the Internet for other educational content. Each school has an e-club to promote activities related to IT among rural students. Muchperseverance has gone into the development of the content. A team of experts from the field has been working on adding value to it. At present, the site provides the following facilities to students:
- career guidance and the syllabuses of various subjects;
- question banks on various subjects to help the students prepare better for exams;
- interactions with other schools to discuss their problems and experiences;
- a question bank wallowing the student to assess his/her general awareness;
- moral stories to help the students develop good moral values;

- biographies of great Indian leaders in various fields; and
- a team of experts at the district headquarters of whom schoolchildren can ask questions (answered within three days) regarding career counselling or any other field at no cost.

Corporate and IT Training

The Internet has opened up opportunities for corporations to use the medium to conduct their training programs in a cost-effective manner. Bangalore-based Wipro Ltd. has introduced a virtual campus for its employees. This new virtual campus creates a learning environment that includes content and community. The e-learning process encompasses course work, class work, lectures, student collaboration, mentoring, guest experts, and informal community communication. The virtual center integrates multimedia, instructor-led, and real-time learning techniques into a facilitated, collaborative learning environment.

Businesses other than IT organizations are adopting e-learning methods. For example, Hindustan Lever Ltd. and Cheminor Drugs have used this method successfully.

Addressing the corporate world, a few sites promise to offer e-learning modules for large and small corporations. Digital think.com is one such site, offering design, development, and deployment of e-learning solutions for various large corporations. It offers fully integrated solutions that combine course content that is aligned with the client's business objectives. The solutions include existing courses and custom-made content for companies. The site offers solutions for various businesses, including financial institutions, healthcare, technology, and consultancy firms, and government.

e-Learning Portals

A number of e-learning portals are offering a range of options for individual as well as corporate customers. A broad spectrum of online courses in IT training and management skill development is

available on these sites. Most of them have tie-ups for courseware, with global leaders such as Smartforce, Element K (formerly Ziff-Davis Education), Harvard Business Publishing, and QuicK-nowledge. The portals offer end-to-end corporate learning solutions.

Opportunities and Barriers

The overall corporate e-learning market in India is expected to be worth US$15.5 million by 2005, by 17% from 2000 to -2005. IT e-learning will continue to contribute significantly to the overall e-learning revenues, but non-IT training is expected to grow significantly, contributing close to half of overall corporate e-learning by the latter part of 2010.

Despite the indications of growing enthusiasm for e-learning in training-intensive corporations, several factors could slow growth. For one, online classes can be clogged due to current inadequacies in bandwidth, although this situation may improve with the growth of high-bandwidth channels. Secondly, although e-learning holds the promise of significantly reducing the costs of learning under many circumstances, real cost-effectiveness depends both on costs and benefits. At present, very little is known about the relative effectiveness with which traditional learning and e-learning transfer to workplace knowledge, skills, and behavior.

The success of online training lies in developing, presenting, and delivering education content in such a manner that it is relevant and appealing to a larger populace. The e-learning concept will have an impact only if non-IT courses are offered. Except in the field of IT training, there are very few content creation companies operating, and the availability of total solution providers is even lower.

Internet penetration in India within the age group of 16-25 years is less than 3%. Added to this is the fact that people are still at the stage of exploring the Internet. Once they become familiar withit, e-learning is anticipated to become a major venue for education seekers.

e-Learning and NPOs

Most e-learning initiatives are presently focused on the government education sector, IT training, and professional training. None of these initiatives provide any inputs pertaining to organizational excellence through productivity and quality improvement. This is where NPOs can play a leading role in providing knowledge inputs regarding the concepts and techniques required for facilitating the transition to world class performance.

In India, the National Productivity Council offers distance learning academic courses based on programmed instruction lessons. These courses assist employees in organizations working to improve productivity and organizational effectiveness. At present, it is offering a one-year correspondence course leading to the National Certificate in Supervision. The subjects include, Principles of Supervision, Personnel Management and Behavioral Science, Productivity Techniques, Works Planning and Control, Store Keeping and Stock Control, and Office Supervision.Plans for offering these courses over the Internet are under consideration. There is scope for courses to be offered in such subjects as TQM, World Class Manufacturing, Six Sigma, etc.

5.   INDONESIA

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Introduction

Digital and multimedia technology, the computer, and the Internet have made fundamental changes in learning and learning procedures. They have a particular impact on distance learning. Distance learning is a process in which learning materials are delivered to students in their place of residence or work, instead of the students going to a campus. Institutions that conduct distance learning must design and manage their activities to meet high educational standards and adjust their programs to the learning characteristics of their students.

Electronic learning digital technology has opened some new possibilities in learning. For example:

-    it allows more interactive learning processes, since new software may provide interactive learning experiences in almost all subjects.
-    A student may engage in a simulation of an experiment before they conducting a real experiment in a laboratory, enabling more effective use of laboratory time and instructor time.
-    It offers increased access to information stores and databases.
-    Students learn using their own processes and styles.
-    It is easy to undertake individual review and repetition of the subject matter.
-    The role of instructors changes from that of an information source to that of a learning facilitator and learning process supervisor.

Institutional and technology support are very important to ensure the quality ofInternet-based distance learning. Good practice indicators include:

- centralized control of the whole system;
- technology for the delivery of the subject material as robust possible;
- written plans for electronic security such as password protection and encryption;
- back-up systems to ensure quality, integrity, and validity; and
- monitoring, evaluation, and feedback plans concerning learning effectiveness and student progress.

Success indicators that can be used are:

- an institutional mission that clearly states its intention to be responsive to student needs;
- a learning approach especially designed for distance and online learning and not an adaptation of traditional distance learning approaches;
- institutional management processes that ensure decision making conforms to the vision, mission, and values of the institution;
- institutional structures and budget appropriate to support projected activities and anticipated student demand;
- access to library support services, both traditional and virtual;
- mechanisms to assess staff performance periodically, including student satisfaction;
- mechanisms to evaluate student and other stakeholder satisfaction;
- mechanisms to trace graduates in the job market;
- self-evaluation mechanisms for the efficiency and effectiveness of institutional activities; and
- evaluation methods and instruments that have been tested for validity and reliability.

The providers of e-learning must be responsible for ensuring that the study program has the same quality as the equivalent program provided by conventional methods.

6. ISLAMIC REPUBLIC OF IRAN

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Information technology (IT) and the Internet have played an increasingly important role in education in recent years. In the new millennium, which is often called the Internet age, we will see many millions of various client-type site devices connected through large, high-speed networks. The Internet is becoming an indispensable tool for commerce, education, research, healthcare, manufacturing, entertainment, etc. We can anticipate that shortly the Internet and IT will touch the daily life of every citizen.

What are Multimedia?

The word "multimedia" refers broadly to information in different formats: text, still images, sound, music, video, and animation. According to some definitions, multimedia describe a presentation that combines at least three of those elements in a single, integrated delivery system. Sometimes the term "desktop multimedia" is used to refer to computer-based applications. Another much used word is "hypermedia," referring to the information structure of the content. If the text, pictures, and sounds are linked to each other by associative links the application may be called hypermedia. The use of multimedia is very loose, and many products referred to as multimedia fall short of the definition. Additionally, a multimedia application is not necessarily a hypermedia application.

Multimedia are not a pedagogical approach nor can they perform wonders. Multimedia are simply a way to deliver a message. If there is no message, all multimedia can do package the emptiness nicely.

What is e-Learning?

e-Learning is a means of learning involving new mechanisms for communication, including computer networks, multimedia, content portals, search engines, electronic libraries, distance learning, and Web-enabled classrooms. e-Learning is characterized by speed, technological transformation, and computer-mediated human inter- actions.

This new mode of learning promises to transform the experience of the classroom in a number of fundamental ways by:
-    augmenting traditional textbook materials with online resources and content portals;
-    enhancing customary "chalk-and-talk" lectures through the use of rich multimedia and interactive content; and
-    extending student discussions beyond the walls of the classroom via a wide range of new communications platforms supporting interclassroom collaboration.

e-Learning will transform schooling outside the classroom as well by:
-    providing students with Web-based tutoring on demand in place of traditional help sessions after class;
-    offering parents a more efficient means of assessing their children's progress via online access to real-time student information systems, rather than through traditional quarterly report cards; and
-    allowing learners to access their course work from multiple locations, including the home, rather than solely on school grounds.

One factor that makes e-learning unique in the history of national education objectives is that it involves much more intimate contact between schools and private, entrepreneurial businesses, i.e., the technology companies that produce the software and hardware solutions or other online content and tools that make e-learning possible. The success of e-learning programs to date has depended upon the capacity of school administrators, teachers, parents, edu- cation businesses, and policy leaders to collaborate effectively. The success of these programs requires these diverse groups to work

together ever more closely. Today, e-learning companies (such as Pearson Learning Network, Project Achieve, Lightspan, and a host of others), work side by side with teachers, students, and parents to bring a richer educational experience to the classroom.

To the extent that these collaborations succeed, they promise to connect learners, educators and the community on a global scale. In doing so, they force us to rethink the purpose and architecture of educational infrastructure in fundamental ways. While e-learning will not replace the classroom, it has the potential to change the purpose and function of the classroom considerably. e-Learning offers new ways to think about designing and delivering education, not only between the ages of five and 18 years, but over a lifetime.

Connectivity, Content, and Community

Connectivity, content, and community are the buzzwords of the new educational landscape. Today, social, technological, and economic drivers are transforming systems of learning. As human capital becomes the chief source of economic value, education and training become lifelong endeavors for the majority of workers. e-Learning offers potentially less expensive, more convenient, and richer ways of becoming educated and of coming into contact with more diverse groups of fellow learners than ever before.

The challenges involved in e-learning will not be overcome without effort, but e-learning represents a long-term opportunity to rethink the value of education over a lifetime. It can help develop the "knowledge workers" required to sustain the growth of the new economy. Those workerso must possess a fluent understanding of both the ideas and communications systems of the modern workplace. Moreover, because of the mobility that is characteristic of e-learning, it can become embedded in many daily activities, and this has the potential to reshape our understanding of the time and place for learning in our lives.

Realizing the promise of e-learning will require forging new kinds of public and private partnerships. In recent years, educators and business leaders have worked more closely together than ever

before. Education businesses such as bigchalk.com have quickly established points of contact with thousands of schools, resulting in a new kind of infrastructure for the development of educational communities. Leading companies such as Sylvan Learning Systems have established strong bonds with consumers and schools around a host of tutorial and remedial services. Many other companies are likewise helping administrators and educators successfully explore the full potential of online learning on a daily basis. By promoting these kinds of partnerships, we can harness the power of e-learning to transform schooling in many beneficial ways. For students and teachers, e-learning offers:

- access to a broad array of content and commentary;
- interactive self-paced learning tools;
- a vast community of learners; and
- distance learning opportunities that very nearly represent a "classroom without walls."

For parents, e-learning provides new ways of staying involved in their children's education. For education businesses, e-learning is a mechanism for creating economic value and human potential. The net effect of successful e-learning programs should be a genuine transformation in the way children learn.

General Awareness of e-Learning in Iran

In recent years, some research centers in universities and other organizations in Iran have undertaken many activities involving the Internet. Online technologies are used for education, training, electronic banking, electronic commerce, etc. In May 2001, a conference on the Internet and electronic city solutions of the highest technical excellence was held on Kish Island, Iran. For that conference, 173 papers were submitted from all over the world, of which 62 were selected for presentation.

Iran University of Science and Technology recently organized a research project on the virtual school and designing interactive multimedia tools for teaching automatic control systems. The major objective (initially conducted by M. Shahri) has been to take a more comprehensive approach to the development of an interactive

computer-assisted instruction package to enhance the learning processes involved in teaching control theory. The package has been developed to assist teaching and learning processes in a number of ways, including:

- Individual teaching and learning processes: The package is developed so that students can interact with it at different levels. This supports an individual teaching and learning process not easily achieved with conventional teaching methods. The package challenges the best students while providing graduated assistance to less able ones.

- Better understanding of the physical phenomena involved in automatic control systems: By using the package, the students appreciate the role and importance of automatic control in the operation of physical systems through simulation and animation examples.

- Enhanced assimilation of basic theoretical knowledge and methods in control engineering: The developed system also provides a more efficient environment to learn the basic concepts of automatic control such as feedback, frequency response analysis, and root locus analysis through continuous interaction with the student, simulations, and tutorials. The package also instructs each student in the application of graphic techniques such as root locus plotting.

- Mastering design of control systems: Most design techniques have been developed empirically, which makes this area quite complicated for students not familiar with such an approach. The design techniques are built into the system to be used interactively by the students. Assistance is available both as a separate session and within a particular design problem.

The employment of a simulation engine, Matlab, has significantly shortened the design period (which can be particularly lengthy when interactive methods are used).

At Amirkabir University, a research project has been completed by M.K. Akbari M.R. Rajaeit, and E. Abdollahi. They have designed

and implemented an experimental virtual university. They have considered organization, management, teaching, students, registration, selection of courses, examinations, general information, communication, and library services within this system.

At the University of Ferdousi, a project centered around an Internet university and Web-based distance education is being conducted by L. Eskandarian and M. Kahani. In this Web-based educational project, research activity and staff activity within a total organizational system are considered. The educational components include self-education and the virtual classroom.

Other organizations and industries such as Iranian Radio and Television Broadcasting Organization, Refah chainstores, Shaluvand chainstores, Melli Bank, Mellat Bank, Seph Bank, Iran Khodro Industries, and Saipa Industries have significant activities involving Internet services for customers underway.

The private sector in Iran is very active in provision of Internet services to customers. There are hundreds of active centers providing computers and Internet services in large cities. The public sector and government have supported these initiatives implicitly but not explicitly. The Ministry of Research, Technology and Higher Education in Iran has recently adopted a decentralization policy. This policy is an opportunity for universities and other educational centers to initiate vast changes in education and training systems. The Internet and online technologies will have a significant role in these changes.

The main barriers to the development of e-learning and Internet technology in the education and training system are social, cultural, and economic factors:

- Expanding the infrastructure for Internet-based technology requires a great deal of expenditure. The government must adopt suitable policies and make appropriate decisions.
- The culture of using the Internet must expand in schools. The Ministry of Training and Education must also develop a culture of using computers and Internet technology.

- The government and parliament must approve and support a legal framework to underpin the development and implementation of Internet technology and e-learning.

e-Learning and Its Impact on National Productivity Organizations

Web-based and online learning has an important role in facilitating and improving the performance of universities and organizations. Rapid growth of the tools and applications of the Internet and rapid access to data have provided a good foundation for developing interactive multimedia-based educational software. However, in Iran, comprehensive and fast access to the Internet is not feasible for all undergraduate students or staff within organizations.

If the conditions required for expanding the implementation of information and communication technology in Iran were met, it could have a huge effect on the productivity of education and training through:
- increasing the quality of courses;
- supporting very high numbers of students;
- provision of online digital libraries;
- cost savings related to expenditure on buildings and other physical infrastructure; and
- cost and time savings, especially for students who are working in organizations and institutes.

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7.   MALAYSIA

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Introduction

e-Learning is the future learning methodology for mass education. It promises education and training at convenient times and places at minimal cost to the user and provider. Opinions about e-learning vary. To some, e-learning is only about making learning materials such as handouts or presentation slides available on the Web. Others see e-learning as online learning with media-rich content, animation, high-quality graphics, audio and video streaming, and synchronous interaction with instructors.

One of the successful examples of e-learning implementation is Cisco (www.cisco.com). According to Tom Kelly, Vice President for the Internet Learning Solution at Cisco Systems, more than 90% of the training for its more than 10,000-strong sales force is online. Cisco has defined e-learning as online delivery of information, communication, education, and training. It is not just e-training but an overarching umbrella that encompasses education, information, communication, training, knowledge management, and perfor-mance management. The e-learning solution is a Web-enabled system that makes information and knowledge accessible to those who need it, when they need it, and at any location. The Cisco definition suggests the elements involved in e-learning are good content, a learner management system (LMS), and a content management system (CMS). The system must be reliable and secure and guarantee the accessibility and integrity of the content.

Elisabeth Goodridge (www.informationweek.com), as cited by International Data Corporation (IDC), estimated that the e-learning market in the USA would grow from US$2.3 billion in 2000 to US$14.7 billion by 2004. Worldwide, the overall e-learning market is expected to hit US$23 billion by 2004. Despite strong customer interest and predictions of huge growth, the development of e-learning has been affected by macroeconomic changes. Training budgets are often the first to be cut when businesses face declining revenues and profits.

Limitations of This Paper

This paper has been prepared with the intention of sharing information about the e-learning scenario in Malaysia. It is not based on a specific empirical study. The content reflects the author's personal belief in e-learning as a new approach to training, especially in the areas of productivity and quality. Some of the input has been gathered by interviewing e-learning suppliers, university lecturers, and content developers and has been developed using reference materials available on the Web.

e-Learning Initiatives

In Malaysia, discussion, debate, and deliberation on e-learning as an option to enhance traditional classroom face-to-face training are being widely encouraged and promoted by the government and by private-sector organizations. e-Learning is not meant to replace traditional classroom face-to-face training but rather to complement it. As e-learning is an infant technology, its impact and acceptance by the users are still in some doubt as many still prefer classroom training for various reasons. However for the purpose of positioning Malaysia to meet the challenges of the knowledge economy, the government has promoted e-learning at both the policy and infrastructure level. In general, pioneering e-learning initiatives and support in Malaysia can be divided into initiatives taken by:
-       the higher learning institutes (IPT);
-       government organizations;
-       the corporate sector; and
-       government policy support.

One government organization that has embarked on e-learning initiatives is the National Productivity Corporation.

Higher Learning Institutions

Higher learning institutions in Malaysia are made up of two distinct sections, the public higher learning institutions and the private ones. Some institutions have been introducing distance learning since the late 1980s as a means to provide opportunities to students where full-time enrollment is limited.

One of the universities that offers distance learning is MARA University of Technology (UiTM). UiTM has been offering distance learning since 1990. The program started with fewer than 100 enrollments but it has since recorded phenomenal growth, enrolling up to 10,000 students in 1999. It is a highly subsidized program, which was initially based on printed hard-copy learning materials provided to students. With the increasing number of enrollments, the university sought better alternatives not only to improve the delivery but also to reduce the subsidy costs significantly.

In 1997, the university decided to adopt e-learning but was constrained by limited resources such as technology skills and the high initial investment requirement. However, the university broke with the traditional monopoly concept by takingg a partnership approach in implementing e-learning. It invited the private sector as a partner. UiTM concentrates on content development, while the partner company deals with technology and investment.

The e-learning system, then called the Flexible Learning Programme (FLP; www.Uitmflp.edu.my), was first launched in December 1998 with an initial 70 students enrolled. More students registered for the program without affecting registration for the traditional program. In May 1999, the enrollment totalled 1,500 students. The increase in enrollment for its e-learning program brought some initial administrative problems (particularly where students compared the fees charged with those applied to students in the traditional program, since students registered for the FLP do not enjoy a subsidized rate and pay full fees compared with those enrolling in the traditional

program). Although given the opportunity to transfer to the non-FLP Distance Learning program, a majority of students preferred to continue enjoying the benefits of e-learning.

Given the popularity of the Internet, clear evidence of acceptance by the students, encouraging performance results, and the readiness of academic staff for change, UiTM decided to embark on full-scale implementation of e-learning in its distance learning program. Currently, a total of seven programs (bachelor and diploma) are offered by UiTM with an enrolment of 2,000 students. UiTM is in the final stages in implementing e-learning in language studies for more than 100,000 students.

Apart from UiTM, 10 other universities and higher learning institutions (public and private) are also moving into e-learning, e.g., University Putra Malaysia (www.upm.edu.my), International Islamic University of Malaysia (www.iiu.edu.my), Malaysian Institute of Management (www.mim.edu), Institute of Management Studies, and Maastricht School of Management. The programs range from diploma to master's level as well as professional certificate programs. These universities and higher learning institutions are adopting different approaches to that of UiTM. Instead of partnership arrangements, they are "subcontracting" some of their programs to private companies.

Another example of e-learning initiatives by universities is the University Tun Abdul Razak (UNITAR; www.unitar.edu). UNITAR was established in 1998 as a privately owned university with the concept of a virtual university from its beginning. It uses mixed-mode approaches, combining e-learning online, CD-ROM-based resources, and traditional face-to-face sessions.

Government Organizations

Beside initiatives by local universities, at least one government organization is in the process of finalizing and testing its own e-learning system. The National Institute of Public Administration (INTAN), the training center for civil servants (www.intanbk.intan.my), is working on accounting modules. All civil servants will be

eligible for the training. The model adopted by INTAN differs from that adopted by UiTM and other universities, as all the hardware, software, and development are owned by INTAN.

Corporate Sector

e-Learning is not only attracting universities and other government organizations in Malaysia. Corporations are attracted by the advantages of e-learning (inexpensive, convenient, consistent, current, self-paced, private, and fostering computer literacy). The Asia-Pacific Broadcasting Union (www.abu.com.my), for example, has commenced an e-learning service that is available online from 40 of 50 member countries. A government-owned company, Pos Malaysia Berhad, is in the final stages of testing the content of an e-learning solution due to be released soon. Pos Malaysian is using e-learning to traincounter staff in accounting and record keeping.

The banking sector is also fast catching up in terms of e-learning initiatives. Banks such as Maybank (www.maybank2u.com), Citibank (www.citibank.com/Malaysia/), and Standard Charted and Federation of Malaysian Unit Trust Managers (www.fmutm.com.my) have in one way or another embarked on e-learning initiatives. Standard Charted's intention is to make use of e-learning to train about 300,000 employees around the globe. In Malaysia, it appears that e-learning initiatives are being implemented more rapidly in service industries compared with other sectors.

Because e-learning is a totally new approach to learning and training, there is some uncertainty associated with it. It needs a proven business model to underpin its survival. However, the perception and belief of many industry players are that e-learning has immense potential in Malaysia. Based on this perception and belief, some companies have ventured into the e-learning business even though thorough and in-depth studies of the feasibility of various business models are still lacking. These companies include MyETutor.com, which has targeted schoolchildren in the age-group between seven to 17 years for online tuition. Some other e-learning companies exist but merely as local hosting partners and distributors for imported content, especially from the USA, Australia, etc.

Government Policy

The implementation of the Malaysian Super Corridor (www.msc.com.my) in 1996 is one example of major initiatives taken by the Malaysian government. Initially the MSC started with seven flagships, electronic government, multipurpose card, smart schools, telemedicine, R&D cluster, worldwide manufacturing Web, and borderless marketing. Most of the flagships are in the final stages of development or final testing. The multipurpose card is at the most advanced stage of development, and initial implementation commenced with the launch of MyCard in April 2001 (www.jpn.gov.my/gmpc/index.htm). The smart schools project is a specific example of e-learning initiatives undertaken by the government. Initial planning is to publish learning materials in CD-ROM format. Later, the study materials will be made available on the Web.

The MSC is now in the process of launching six new flagship projects under the second wave, i.e., model contract and government procurement and contractual procedure, human resources, e-business, integration and coordination, and MSC-specific issues. The e-business flagship, which is under the supervision of the Ministry of International Trade and Industry (MITI; www.miti.gov.my) is giving attention to e-learning as part of the flagship to enhance the knowledge and skills of small and medium industries in preparing to meet the challenges of the knowledge economy through a lifelong learning approach.

Another important move to support e-learning in Malaysia has been the approval of e-learning modules as an "Approved Programme" under the Human Resource Development Fund. The fund is administered by Pembangunan Sumber Manusia Berhad (www.hrdnet.gov.my). The government pays 75% of the fees from the fund for any approved online training program.

National Productivity Corporation

The National Productivity Corporation (NPC; www.npc.org.my) is a statutory organization under MITI. Under the Eighth Malaysian

Development Plan (RMK8), 2001-2005, the NPC is given the task of promoting the use of information and communication technology (ICT) as an enabler for productivity and quality improvement. The NPC believes that e-learning is one of the ways to achieve cost savings in training, reach a wider audience, and improve training delivery mechanisms for productivity improvement.

e-Learning initiatives in the NPC started in 1996 but were largely driven by technology. The NPC chose one of its high-demand training programs, (Company Manual for Productivity Assessment) and converted into self-paced learning material on CD-ROM. The sales of the published CD-ROM have brought in revenue that covers the cost of production. This success created the confidence needed within the NPC and confirmed that e-learning could be a viable training extension to its traditional face-to-face training. In December 2000, the NPC decided to capitalize on advances in Internet technology as a way of gaining access to larger numbers of its target group. Given its limited resources (skills and technology), the NPC is adopting the UiTM model and has proposed partnering with a private company for its e-learning initiatives. The NPC has less experience than UiTM, which has been working in the area of distance learning for more than seven years. It is a steep learning curve for the NPC but it is planned to have two pilot e-learning modules ready for implementation within six months.

e-Learning Barriers

As stated earlier, one of the biggest challenges to any e-learning service is reliability. e-Learning requires stable and secure technical systems, good bandwidth, good content, and a positive attitude from instructors. Other factors that may influence the development of e-learning include investment cost, staff skills, and operating/maintenance costs. Once the technical requirements of the system are in place, the next challenge is the development of content. The cost of designing self-paced interactive content may be a determining factor.

If the required investment is a deterrent, the next challenge is more crucial, i.e., human resources (skills). It is a challenge for any

organization to ensure that its internal human resources pool is capable and actively involved in the development of e-learning content and systems. Cisco Systems, one of the shining examples, took five years and many false starts before achieving its stature today. The training instructors should develop e-learning content. They must be familiar not only with subject matter and systems but also have vast knowledge in instructional design. Most are trained as traditional face-to-face instructors. One of the inhibitors is resistance to change. The institution should look into motivating factors such as an incentive schemes for instructors as e-learning initiatives often involve the extension of workloads. New technology-based instructional design also involves upgrading of skills and expertise.

e-Learning is not a walk in the park. It requires the learner to learn in a new way, and not all learners are IT literate. Furthermore, e-learning means lack of face-to-face social interaction and does not always take into account different learning styles. These factors may drive away learners and become a threat to e-learning.

Another important factor is operating costs; i.e., the costs for Internet connection. In the case of dial-up connections, in Malaysia the cost is between 2.5 and 3 cents (US$1=RM3.80) per minute depending on the Internet service provider. Fixed monthly rates are available in limited areas. Internet connection rates low enough to cater to e-learning needs are still not competitive. This will slow the progress of e-learning. Learners will have to pay more in connection fees even if they might be paying less in tuition fees.

e-Learning Opportunity

In Malaysia, the number of Internet subscribers has increased more than 10 times to 2.372 million in September 2001 from only 0.205 million in 1997, as shown in Table 1 (data extracted from the Malaysian Communications and Multimedia Commission Web site, www.cmc.gov.my). The figures show one Internet subscriber per 10 people. This is a general indication that Internet usage is a way of life in Malaysia.

Table 1: Statistics on Internet subscribers,*1997-2001

	1997	1998	1999	2000	2001#
Population (million)	21.7	22.2	22.7	23.3	23.7
Growth (%)		2.3	2.2	2.6	1.7
Subscribers (million)	0.205	0.405	0.668	1.659	2.372
Growth (%)		97.5	64.9	148.3	43.0

*Dial-up users, as of September 2001.
Source: Malaysian Communications and Multimedia Commission.

The generation now leaving schools, colleges, and universities are more ICT literate and used to surfing the Internet. This is the result of a new curriculum imposed by the government which introduces ICT even at primary schools. In addition, the government through the Pembangunan Sumber Manusia Berhad has implemented special ICT training schemes for employees to educate those who are already in service.

Internet society, ICT-literate citizens, and a challenging environment require a new way of training. The training must be current, on demand, and economical. Traditional face-to-face training will become more irrelevant and expensive. e-Learning will gradually become more appropriate.

Conclusions

e-Learning is not intended to replace face-to-face classroom training but can be used to enhance traditional training. However, the biggest challenge e-learning services face may be the mindset that says learning is done best in a classroom with the instructor standing in front of the participants. Change management and proactive promotion are critical factors for the success of e-learning initiatives.

It is easy to understand that e-learning needs a high level of initial investment. However, the monetary burden can be alleviated by working in smart partnerships. On the other hand, any attempt to hand everything to a third party is the way to failure. Another important point to note is that projects need sufficient time to grow. Cisco Systems took five years to make e-learning a success. This means there will be no shortcuts, but learning from others' experiences will help to avoid repeating the same mistakes in the ongoing search for e-learning success.

8.   NEPAL (1)

rural poor improve their living standards. By creating community-based information centers in rural areas, rural people will enjoy access to global information. This will create awareness, which not only contributes to improving income but also enhances the quality of living. Realizing this potential, provisions are being made in the forthcoming Tenth Five-Year Plan to establish 1,500 community-based IT centers in different parts of the country and also to provide power supplies to them through alternate energy sources where power supply through the national grid is not available.

His Majesty's Government is serious about promoting information and communications technology and has accorded top priority to making technologies accessible to the rural populace through the Tenth Five-Year Plan. The emergence of information and communication technology has opened new vistas and opportunities. Even the remotest villages of Nepal have the potential of tapping the global repository of knowledge. His Majesty's Government has put its efforts and resources toward applications of IT in government offices, educational institutions, industries, and businesses. Young people and IT educational institutions are showing growing awareness of and interest in IT educational packages. They are exploring the opportunities arising from IT-related training, and the latest figures show that a growing number of students use the Internet to take courses offered by foreign universities.

His Majesty's Government adopted the Information Technology Policy, 2000. The objectives of the IT policy are to:
- make IT accessible to the general public and increase employment through this means;
- build a knowledge-based society; and
- establish knowledge-based industries.

One of the strategies for achieving the above objectives is to enhance professional efficiency through the use of IT. For human resources development and dissemination of IT, the policy makes the following provisions:

- Necessary facilities will be provided to the universities to offer graduate and postgraduate classes of international

standard in computer science and computer engineering subjects.

- A distance learning system will be introduced through the Internet and intranets in addition to from radio and television. Networking systems like school-nets, research-nets, commerce-nets, and multilingual computing will be developed.
- A public awareness campaign on the importance of IT will be launched extensively through the electronic media.
- The necessary legal infrastructure will be created for the promotion of telemedicine, distance learning, tele-processing, and e-commerce.

The government is planning to lay optical fiber cable along the East-West Highway and priority is being given to the development of IT in the 10th Development Plan. With the growing number of Internet users each year and the lucrative offers of internet service providers for Internet promotion, it is anticipated that Internet-based business will grow significantly. The high telecommunications tariff is the major impediment to the growth of Internet use in Nepal. If a separate line can be provided to Internet users at minimal cost, the sector will see significant growth.

Although the number of Internet account holders was only 25,000 in 2001, it is expected to increase by 30% per year to reach a total number of approximately 150,000.

9.   NEPAL (2)

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Nepal is a landlocked country with limited natural resources, a large number of educated unemployed, and a very fragile environment. Ideally, the industry most suitable for Nepal would be a clean industry that utilizes a large number of educated people and helps to lead the nation through a process of socio-economic development. The information technology (IT) industry is such an industry. IT products and services are intangible and can be exported via high-speed satellite communications. There is no need for access to a seaport or even an airport, thus removing the landlocked status of Nepal as a handicap, which is almost always the case with most other industries established in Nepal.

The Past and the Present

The history of human resources development in the IT sector of Nepal is not very long. In South Asia, Nepal is the youngest in this field. The first computing training was conducted by the Central Bureau of Statistics (CBS) of His Majesty's Government in 1970 in which some 15 people were trained in data processing for the national population census of 1971.

National Computer Center

The National Computer Center (NCC) was established in 1974 and was the beginning of the history of IT in Nepal. It was established by the state to develop computer expertise among civil service workers. Though this program achieved some success, Nepal did not really begin to develop a modern IT industry until the early

1980s. For the 1981 census, the UK government provided high-level computer education and training for 20 technical officers. In addition to this, five senior NCC officers received basic computer training in the UK and an advanced course in the USA. In 1982, the NCC established a training division, which was the first of its kind in Nepal.

Private Sector

In the early 1980s, the government passed several crucial laws, including the Industry Enterprises Act and the Foreign Investment Act. These paved the way for foreign computer companies to begin retail operations in Nepal. The first IT business to set up shop was MEPS Private Ltd., an Apple dealership that still exists.

In 1982, American investors set up a Nepal-based company called DSI. To build up local manpower, DSI accepted 25 people per quarter for a one-year computer training course, and the first Nepali programmers completed contract work in both Kathmandu and California. DSI folded in 1993, but some of its original competitors are names still familiar a decade later. Mercantile Office Systems, which had previously dabbled in hardware, and Professional Computer Systems Ltd. (PCS) started to develop large-scale custom software packages for banks and other data-intensive businesses and these product lines continue to the present.

By 1995 the Internet wave had reached Nepal and, as in many other countries around the world, the Web has greatly increased IT awareness among all city dwellers, not just those who use computers at work. Mercantile and World Link were the earliest Internet service providers (ISPs) and they helped popularize dial-up services not only throughout the capital but also in the other main cities.

Educational Institutions

Under the instructions of the Ministry of Education, private schools started computer science as an optional subject in 1990 in the 9th and 10th grades. There are about 24,000 schools, (including primary, middle, and secondary) in Nepal. Only about 350 are offering

a two-year computer science courses (9th and 10th grades). Some 400 junior schools are running informal computer courses as an extra activity. The Council for Technical Education and Vocational Training (CTEVT) also offers skill-oriented computer courses. About 25 institutes of 165 CTEVT institutes offer these courses at present. Students completing these courses are able to work as computer operators.

In addition to these services, there are about 1,000 private computer training institutes all over Nepal. Only about 35 offer computer science courses. These courses were introduced by the Ministry of Education in 1999. Most of the institutes giving computer science courses are concentrated in the Kathmandu valley. On the university front, Kathmandu University started a B.E. in computer engineering in 1994. The Institute of Engineering under Tribhuvan University started the same course in 1998. Pokhara University and Purbanchal University followed by starting a bachelor's degree in computer science in 2001.

At present, there are 21 colleges in Nepal offering computer education. Tribhuvan University also started a computer course in its master's in education stream in 2001 and is to start an equivalent course in its master's in engineering program in 2002.

Government IT Strategies and Policies

In 1998, the government established the Ministry of Science and Technology, which has taken up the cause of IT on a full-time basis. The National Planning Commission started incorporating IT development projects into its five-year plans some time ago. Strategies include:

- High priority is given to research, development, and extension of IT with the participation of the private sector.
- Domestic and foreign investment will be encouraged for the development of IT and related infrastructure.
- E-commerce will be promoted with legal provisions.
- IT will be used to assist e-governance.
- IT will be applied for rural development.

- The ITindustry will be promoted.
- Export of services related to IT (software and hardware) will be increased to 10 billion rupees within the next five years.

Policies

The following policies were developed and implemented to support the above strategies:
- IT was declared a priority sector.
- One system was adopted for the development of IT.
- R&D in the field of information technology was made a priority.
- An atmosphere conducive to attracting investment in the private sector, keeping in view the private sector's role in the development of IT, will be created.i
- The use of computers in the private sector is encouraged.
- Physical and virtual IT parks will be developed at various places with private-sector participation.
- IT will be used to promote e-commerce, and e-education, e-healthcare, and to transfer technology to rural areas.
- A national IT center will be established.
- A fund will be established at the national level by mobilizing resources from His Majesty's Government, donor agencies, and the private sector to promote R&D on IT and other related activities.
- A venture capital fund will be set up with joint partici-pation of the public and private sector.

Development of e-Learning

In Nepal over the last few years, several private institutes have mushroomed. These institutes offer short- or long-duration nonfor-mal computer courses. There are about 1,000 private computer-training institutes nationwide. Most private institutes are offering skill-oriented computer training programs with very little input of theoretical knowledge. A variety of training programs is also being implemented without any coordination.

Businesses, industry, and various government departments are increasingly using computers, such as the Nepal Electricity Authority and Nepal Telecommunication, travel agents, airlines, hotels, banks, and private nursing homes. This has sparked increased demand for trained and skilled computer personnel. The limitations are:

- At present, the total bandwidth available in Nepal for Internet usage is very narrow at 7 MB. The concerned ministry, therefore, has the task of upgrading the bandwith for further development.
- A main complaint of ISPs is that they cannot receive the required telephone lines in time (although much additional revenue has been generated through the Internet/e-mail messages)
- Additionally, telephone charges for Internet users need to be reduced. This will eventually translate into added revenue for the government as the use of the Internet gathers momentum with the lower telephone charges.

Main Barriers to the Development of e-Learning

Despite encouraging developments, certain issues pose serious hurdles for the development of IT in education.

- The computer training provided by the private sector has not been streamlined.
- Nepal's higher education system is producing unemployed graduates in nontechnical and nonprofessional areas.
- The government has not accorded adequate priority to expanding the base for IT-related courses in the past. Even now, no satisfactory support has been given to the private sector.
- Although, theoretically speaking, universities are capable of monitoring and maintaining quality and quality, the capability of the colleges in handling education and training in new and emerging areas of IT must be more closely watched. There is no close linkage between industries and institutes to help maintain quality.
- Many of the computers at the ministries and government departments are underutilized. More than 80% percent of computers are used only for word processing documents. They need to be used more as a tool for good manage-

ment and governance.

Educational institutes like schools and universities must provide quality IT- and skill-oriented education. At the same time, industries and business should create IT-related jobs and services. For this, banks and financial institutions should be ready to provide loans to private parties engaged in software development, hardware manufacture and maintenance, and human resources development.

The government for its part needs to provide viable national IT policies, cyberlaws, and monitoring and support systems. Some opportunities for the development of e-learning are as follows:

- IT education should be introduced in non-IT disciplines like social sciences and to professional associations as well as individual professionals.
- There must be partnerships between the public and private sector in IT businesses and related education and services.
- The training of basic and middle level manpower must be left more to the private sector.
- Linkages to the IT Park being developed near Kathmandu, should be forged, where IT companies use the incubator at the park to promote new business ideas. The IT Park will also be involved in international linkages and attracting foreign IT companies to invest in Nepal.

Social Impact

Most of the media, government departments and ministries, Nepal Electricity Authority, Nepal Telecommunication Corporation, Water Supply Corporation, travel agencies, and most financial organizations in Nepal use computers. The introduction of e-mail, Web sites, different types of financial cards, growing knowledge of computers, and the expansion of the television network are all bringing changes to Nepalese society. The style of television program production and advertisements are changing perceptions and expectations. Young people enjoy the use of mobile phones, correspondence using e-mail, and are accustomed to different types of marketing of consumer goods. Change is occurring in the urban areas, but the growth of IT industry is in its initial stages.

10.   PHILIPPINES

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Since 1997, institutions in the Philippines have been exploring the capabilities and potential of e-learning as one of the major driving forces in education and training. EduQuest is one of the institutions which has ventured into "virtual classrooms." It commenced with Lotus' Learning Space, through a joint partnership with the De LaSalle University. Learning Space was used by the students to do their homework, participate in online discussions (chat rooms) with their fellow classmates and their professors, receive reading materials, and submit their assignments. With the expansion of telecommunications and increased bandwidth, more people had access to telephone lines, cable, and DSL lines. The development of on-line education and training increased. When the government opened up the telecommunications infrastructure to more private institutions, (terminating the monopoly of PLDT), it paved the way for competition that brought about better and faster service.

In December 2000, in an informal survey by DigitalFilipino.com (the Philippine Internet Demographics organization), it was estimated that there were about two million Filipino Internet ssers, 200 Internet service providers, and 1,500 Internet cafes. Sixty-four percent of users are college graduates, 21% finished graduate school, 85% are single and 14% are married, 36% are IT professionals, and 25% are students. The cost using the Internet in Internet cafes ranges from 10 (US$20) pesos to 25 (US$50) pesos per hour in the provinces; in Manila its about 30 (US$.60) to 150

(US$3) pesos per hour. It was also noted that the Filipino Internet user is someone who has access to the Internet either at school, office, or internet cafes. This does not necessarily mean that he/she is a computer owner.

The promotion and propagation of e-learning began in private institutions because they had the advantage of better technology. To catch up with this new and fast growing trend, the Commission on Higher Education (CHED) published the CHED Memorandum Order No. 35 to help ensure the quality of education that people would receive through e-learning and to assure future employers that the education and training meet appropriate quality standards. The Philippines is a very "diploma-conscious" country. For one to move up in a company or government institution, it is very important not only to have skills and intelligence but also to have degrees and diplomas. In the universities, e-learning has been focused on the master's and doctorate programs to address the needs and desires of people to upgrade their knowledge and skills, with the convenience of learning on their own time and in their own learning environment.

De LaSalle University has offered a course in business ethics on-line since January 2000. The course is run in a mixed-mode (face-to-face combined with online) basis. There are 20 students. Students are prescreened for Web skills and willingness to abide by the online guidelines and to ensure that their computers are compatible with De La Salle's computers. The lecturer must ensure that the students join the required chat sessions and that they participate in the online discussions. The prescreening of the students is important, especially in relation to the skills and knowledge in the use of the computer, chat rooms, and Internet. Since these will be the tools that they will be using, the institution must ascertain that the students have the skills to participate fully in the course.

At this point, there are still no 100% e-learning master's, graduate, or collegiate courses, because of the strict requirements of the CHED. This has not deterred schools and universities from pursuing this method of teaching.
The Philippines has increased the availability of broadband, cable

Internet, and DSL lines. Internet access by companies and homes is faster and more reliable. Companies in particular are taking full advantage of the improved facilities. Managers of companies are taking courses online to advance their careers.

The creation of the Information Technology and Electronic Commerce Council (ITECC) in July 2000 paved the way for bigger and faster highways leading to a technologically competitive Philippines. The merging of the government's CHED MO No. 34 and the ITECC means that a full e-learning course will soon be offered. The policies of the government for communications infrastructure expansion with the assistance of private telecommunications businesses and connections to about 1,702 islands will enable the outcome to be achieved quickly.

The Development Academy of the Philippines (DAP) has produced online manuals for some of its IT courses. This lessens the cost of developing manuals. It is hoped that one day the DAP master's in public management course will also be partially based on e-learning.

e-Learning is the 21st century method of teaching and learning. It is will reach more people, enhance skills, and encourage intellectual growth anywhere with access to the World Wide Web.

11.   SINGAPORE

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Introduction

In the knowledge economy, the pace of change has increased and this has resulted in rapid product and technology obsolescence. To cope with the rapid changes, new knowledge and expertise need to be acquired more quickly and more cost-effectively. This need to acquire knowledge quickly, together with the advances in technology (in particular information and communications technologies), has resulted in the development of a new form of training delivery: e-learning. e-Learning in the broadest sense refers to training delivered with the aid of a computer and increasingly involving the Internet.

The potential for e-learning is great. In the Asia-Pacific region, the International Data Corporation (IDC) estimated that the size of the e-learning industry will be worth US$462 million by 2004, 14 times higher than its value in 1999.

Awareness

In the initial stages, activities in e-learning were mainly dominated by specialized online learning companies. These companies focused on building enabling tools and experimenting with multimedia features made possible by technology. However, in the last few years, awareness of e-learning as an alternative training delivery method among companies has increased significantly. Many companies have expressed interest, and major educational institutions as well as companies have already invested in e-learning.

Adoption in the Corporate Sector

In a survey conducted by the Productivity and Standards Board (PSB) in 2000, while traditional training methods such as on-the-job training (OJT), coaching, and face-to-face classroom training remained the most highly used, about 15% of companies used the Internet to deliver training. Despite the current low adoption rate, there is potential for growth in Singapore. e-Learning was perceived by 71% of companies surveyed to be more effective than face-to-face training.

One company that has embarked on e-learning is CityCab. It has launched a Web-based Service Excellence Training Programme to instruct taxi drivers how to communicate more effectively with commuters. The program enables the training to be completed in seven to nine hours instead of the 14 hours required for classroom training. This allows for drivers who work in shifts and gives them the flexibility to learn according to their schedule.

Adoption in the Education Sector

In higher education, many of the institutions of higher learning in Singapore have already implemented or are in the process of making e-learning available to their students. For example, the National University of Singapore in 1998 set up a multifunctional online learning environment that allows professors to distribute a wide variety of course materials quickly and easily to students, and students can access these materials whenever and from wherever they want. The Temasek Polytechnic has also embarked on this, and students are now able to complete some of their courses online. This allows students to study anytime, anywhere, and at their own pace.

Benefits of e-Learning

The key benefit of e-learning is that it offers a complete new model of learning that meets the demands of a fast-changing economy. e-Learning provides solutions to immediate problems. Besides offering real time training, e-learning also allows learners to learn

at their own pace, and empowers them in terms of their own learning. For employers, it minimizes disruptions at work and reduces the costs of training such as accommodations and travel.

In a recent survey conducted by the Knowledge Platform on the state of e-learning in Singapore, the most important perceived benefit of e-learning was that it can be deployed faster and to more people. Cost saving was ranked four out of the five benefits, indicating that it is not the most important consideration.

Ranking of benefits of e-Learning

BENEFIT	RANK
Learning can be deployed faster to more people	1
It allows staff to learn at their own pace	2
It saves staff time out of the workplace	3
It saves money	4
Learning can be standardized across organisations	5

Source: Knowledge Platform

Barriers to e-Learning

In terms of barriers to e-learning, ranked first was the concern of companies that employees may not be able to accept and adjust to this new form of training delivery. The second most cited barrier was the concern that the e-learning industry was too young and unstable. Companies expressed reservations about the content quality due to the lack of clear standards. Moreover, companies were not confident about evaluating the e-learning courses. Hence, they were unable to ensure its effectiveness as well as its perceived benefits over traditional training methods.

Multimedia and e-Learning

Ranking of barriers to e-Learning

BARRIER	RANK
Our staff will not get used to the new way of learning	1
The industry is too young and unstable	2
Our IT infrastructure will not support it	3
We do not know where to begin	4
Our senior management are not supportive	5
Our organization is too small	6
We do not have the budget	7

Source: Knowledge Platform

e-Learning Initiatives in Singapore

In Singapore, various agencies have been actively involved in developing the e-learning industry as well as promoting e-learning to organizations. The following are some of the agencies:

Infocomm Development Authority of Singapore
The roles of the Infocomm development Authority (IDA) are to act as the catalyst and facilitator to enable Singapore to become the trusted e-learning hub for the Asia-Pacific region. Through collaboration with relevant government agencies and industries, it aims to create a vibrant e-learning business environment in Singapore.

e-Learning Competency Centre
The e-Learning Competency Centre is an independent body set up to inform, promote, and regulate e-learning standards that will be relevant to Singapore. Specifically, it aims to facilitate the promotion of e-learning applications and standards, and formulation of e-learning standards, certification of e-learning systems, products, and services as well as development of e-learning models.
SPRING Singapore

The mission of the SPRING Singapore is to raise the productivity of Singapore, and one key thrust area is raising the skill level of the workforce. e-Learning is a new tool that can be used by companies to enhance the effectiveness of training as well as increase training participation. The SPRING Singapore's role is to promote this new tool to companies.

One of the initiatives launched by the IDA and the Ministry of Manpower (MOM) is the Strategic Manpower Conversion Programme (SMCP e-learning). This program aims to train a pool of skilled manpower for the e-learning industry. One area covered by this program is instructional design. Under the SMCP, non-e-learning instructional designers are trained as e-learning instructional designers to create e-learning solutions for both the education and corporate sector.

Conclusions

Besides improvement in the quality of education and training and potential cost savings, the most important benefit of e-learning is that it offers a possible solution to the demand for continuous knowledge acquisition in a fast-changing environment. Despite the benefits, adoption in Singapore is still relatively low. While there is general awareness of the benefits of e-learning, many companies are uncertain about the quality of the content. However, as the industry matures through the efforts of the various agencies, e-learning is expected to grow significantly in the future.

12.   THAILAND

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Thailand Productivity Institute

In 1994, the Thailand Productivity Institute was established as an independent organization under the Ministry of Industry, supported and jointly funded by the Ministry and the Foundation for Thailand Productivity Institute (FTPI). As a national productivity organization, its mission is to create widespread consciousness of the tenets of continuous productivity improvement as well as to stimulate awareness of quality and efficiency concepts. Efforts are also expended on encouraging businesses to realize the pressing need for enhancing competitiveness by boosting effectiveness and efficiency. The major strategy stated in the Ninth National Economic and Social Development Plan (2002-2006) consists of "building the country's capacity and competitiveness through public relations, networking, and formal and informal educational procedures."

Apart from training and consulting services designed to further this strategy, the Thailand Productivity Institute has undertaken an extensive range of activities:
-       producing publications, including books, journals, newsletters, posters, brochures, and audiovisual materials for sales and distribution;
-       organizing activities for specific groups to encourage the understanding and awareness of productivity through seminars, study missions, exhibitions, campaigns for Thailand Quality Awards, photo competitions, and youth camps;

- disseminating productivity improvement concepts through radio and television programs in the form of short documentaries, magazine articles, newspaper supplements, and advertising slots;
- designing and developing a "productivity vourse" for use in a curriculum for students in vocational education fields with the objective of encouraging young Thais to develop a mindset oriented toward productivity and foster a quality future workforce;
- implementing the distance learning project "basic productivity improvement" to augment the skills of factory workers; and
- maintaining a Web site for the promotion of FTPI services and activities.

During the past several years, these activities have been undertaken with the use of multimedia technologies. IThere is a plan in place to use multimedia tools in all FTPI promotions. For example, one scheme for distance learning will allow workers to conduct their studying and testing through the FTPI Web site. However, as of now, the infrastructure necessary to implement widescale e-learning is not yet in place.

State of the Nation

According to the International Institute for Management Development (IMD) and the World Economic Forum (WEF), Thailand's international competitiveness over the past several years has decreased. Through analysis of the recent economic crisis it has become clear that Thailand has an insufficient number of skilled personnel to compete in the global market. In addition, Thailand is also struggling to develop the manpower to cope with rapid economic change.

In today's global economy, the racing currents of news, business, and information exchange wield a strong influence. The Internet has changed everything, including the rules and methods of competition. This is evident when it is noted that marketing through e-commerce has increased competition among retailers worldwide.

With heightened competition comes a greater demand for know-ledge workers, but in Thailand the scarcity of skilled workers is greater than ever before. Many groups are working to remedy this situation. One avenue of improvement that has recently emerged is the Internet.

The Internet has changed the way we learn, and e-learning is the name for this revolution. It has taken on a new significance for it is now interactive, engaging, affordable, and available anytime, any-where. However, in its current form accessibility is a concern. The poor and less educated are at a disadvantage. While the rich and educated are encouraged to capitalize on the benefits of infor-mation technology (IT), those on the opposite end of the socioe-conomic spectrum find these advancements much more difficult to realize. The school system is working steadily to remedy this disparity. With the proper resources, teachers will be prepared to ready today's students for the technology-based economy of the future. This is one way e-learning can serve to great advantage. Digital content and networked applications will support teachers as they transform their students' learning through such systems as UniNet and Schoolnet. As all students, regardless of socioeconomic factors, are exposed to more advanced systems of thought, they will grow increasingly prepared to hold positions in the IT sector.

Case Study: UniNet

Since the Thai government has recognized the importance of a nationwide education system, it has placed the education issue in the National Economic and Social Development Plan. Currently, there are 195 graduate universities in Thailand, 68 of which are in Bangkok. To encourage the majority of the population, who reside outside the metropolitan capital, the government developed a policy to expand educational opportunities into the countryside. One focal point of this policy is to ensure equal educational opportunity, especially for students in remote areas. To meet that objective, in 1995 the Ministry of University Affairs proposed a plan to Con-gress to implement distance learning using the IT system UniNet (Inter-University Network). This was approved in 1997 with a three billion baht fund to be dispersed over five years.

UniNet is a national network overseen by the Office of Information Technology Administration for Education Development under the Ministry of University Affairs. UniNet provides national and international education network services and R&D technologies for use in all universities and institutions of higher education in Thailand. The obiectives are:

- Set up an IT infrastructure to connect all universities and institutions and every campus throughout the country, to be called UniNet. This will be accomplished through the establishment of an ATM network via 155-Mbps bandwidth fiber optics to connect the networks in Bangkok areas. Those in rural provinces will be connected to the Bangkok network through digital leased lines with 2-Mbps bandwidth.
- Develop self-study centers by providing an electronic library database that will include Internet service, multimedia materials, and video on demand through the high-performance network.
- Develop social learning and lifelong learning systems by creating multimedia courseware and provide knowledge databases and distance learning systems.
- Train teachers and assistants to apply IT in educational development.

Stages of Implementation
- Phase I (1996) Implement new technology in order to provide educational opportunities throughout the country by building an IT network to connect 15 universities with remote institutions.
- Phase II (1997-2000) Expand the IT network stations to include nine more universities and build new classrooms in universities and in remote institutions. Complete the Internet Gateway, a center to increase efficiency by connecting with Internet stations throughout the world. This stage incorporates universities and institutions and aims to develop public universities into an education information superhighway.
- Phase III (2001) Connect the IT stations in every university and college throughout the country.

- Phase IV (2002) Set up distance learning rooms in every institution and build more classrooms where necessary.
- Phase V (2003) Outfit the IT network with a videoconferencing system in cooperation with the Communication Authority of Thailand and the Telephone Organization of Thailand.

Benefits

The benefits of UniNet will be to

- expand access to educational opportunities to remote areas effectively and efficiently within the constraints of a shortage of qualified teachers;
- conserve funds by alleviating the necessity of establishing new universities in remote areas;
- save time and expense in educational management;
- support communication between universities;
- provide an avenue for people in the countryside to raise their quality of life and to offer a solution to increasing unemployment; and
- reduce the socioeconomic gap between people in cities and the rural areas.

Conclusions

In this constantly changing world, newly developed technologies emerge daily. A practice of continuous learning is needed to keep up with the changes. It is necessary for government agencies to recognize this need and support the workforce in its drive to increase competitiveness and reach its potential. UniNet is a valuable tool to keep up with these changes, but it is only one step. In the future, e-learning will be accessed by learners from primary school onward. With diligence, Thailand can meet the challenge of making e-learning available to all.

APO Seminar on Multimedia for Productivity Promotion and Enhancement, *25-29 March 2002, Taipei, Taiwan, Republic of China*

1.   LIST OF PARTICIPANTS AND LIST OF RESOURCE SPEAKERS

A.   Participants

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B.   *Resource Speakers (alphabetical)*

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2.   PROGRAM
(25-29 March 2002)

Date/Time   **Activity**

Mon. 25 March

Forenoon   Opening Ceremony
                      Presentation and Discussion:
                      Information Technology and Its Application on
                      Promotion Activities
                      by Dr. Ja-Shen Chen

Afternoon   Presentation and Discussion:
                      Office Productivity Enhancement through IT
                      Application-CPC's Experience
                      by Mr. Frank Pai

Tue. 26 March

Forenoon   Presentation and Discussion:
                      Technology and Innovation in Education and
                      Training
                      by Mr. Graeme Dobbs

                      Presentation and Discussion:
                      e-Learning(in an Australian context)
                      by Mr. Graeme Dobbs

Afternoon   Presentation Country Papers (II)

Wed. 27 March

Forenoon   Presentation and Discussion:
                  Building a Knowledge Management Solution
                  by e-Learning
                  by Dr. Min-Chow Hong and Mr. Philson Tang

Afternoon   Visit to National Central University

Thur. 28 March

Forenoon   Presentation and Discussion:
                   e-Learning Content Design and Total Solu-
                  tions Provided-Introduction to GTKnet's e-
                  Learning Experience
                  by Mr. Steven Chen

                  Presentation and Discussion:
                   e-Learning Technology and Application
                  by Ms. Shumin Chuang

Afternoon   Presentation and Discussion:
                   Learningware Development
                  by Mr. Graeme Dobbs

                  Presentation and Discussion:
                  Evaluation e-Learning
                  by Mr. Graeme Dobbs

Fri. 29 March

Forenoon   Summing up Session
                  Closing Session