CONTRIBUTION
TO THE STUDY FOR A STRATEGY OF e-TRAINING
DEVELOPMENT
IN THE CONTEXT OF DEVELOPING COUNTRIES

DR. THAI THANH TUNG Ph.D.
Center of Online Instructional Technology- Faculty of Information Technology
HANOI OPEN UNIVERSITY
NGO 191, DE LA THANH, CAU GIAY, HANOI, VIETNAM
Tel : (844)835933     Fax: (84 4) 8695993
http:www.fithou.edu.vn
tttung@rocketmail.com

Abstract

The booming of Information Communication Technology (ICT) since the last decades of the past century has brought fundamental impacts on the socio-economic life in all around the world in transition to a New Economy. The main characteristic of the new economy is that presently information processing and transmission become the principal motivation of the society. To cope with the big changes in social life, people have to continuously update their knowledge, to be continuously re-trained. The traditional division of life into 3 separate periods – childhood and youth devoted to schooling, adulthood and working life, and retirement – no longer corresponds to the present situation of the society. Education and Training become an important need for the whole society. The time to learn is now the entire lifetime. Education and Training cannot be limited to that inside of school. More and more opportunities for learning out of school are occurring in all fields, while skills in the traditional sense of the term are giving way to the ideas of developing competence and adaptability.

The essential change in content and goal of learning implicated the realisation of new training forms using new technologies: Open Learning (OL) with full support of ICT, e-Training (ET) is the only solution which can respond to the big challenge of education and training at present time. The use of ICT support has brought a remarkable change to
the traditional training technology, not only for open learning but also in the traditional teaching – learning processes in the last few decades.

This report is the summary of author’s research results which have been carried out in the last 5 years in the field of applied ICT in supporting teaching and learning processes especially in Open Learning. Some results have been presented at the National Conferences and Workshops in 2001, 2003, 2004 and International Conferences 2002 in Canada, 2003 in Shanghai as well as being carried out at Center of Online Instructional Technology, Faculty of Information Technology, Hanoi Open University (FITHOU) as a pilot project of the scientific research of Ministry of Education and Training in 2004.

In part I, the report examined the basic theory in Teaching – Learning processes under the point of view of Information Theory. In this part, the author has analyzed the importance of the interactive impacts with point of view "learners are central". Based on that philosophy, the author has established some of the most important standards for the system which serves as a supporting tool for the ideal learning process, pointing out the major tools and technology support learning have been used in the last few decades and analyzing the advantages and disadvantages of those.

The content covered in part II is focusing on the technology. The author has designed a “Virtual University” with all functions such as “Introduction, Guidance, Orientation – Student Management – Knowledge and Materials Delivery – Online Interactive”. Moreover, the need of human resources to effectively operate all functions has been determined such as “Webmaster, administrator, moderator, redactor, online tutor …”

The contribution of this research is to prove that in the condition of developing countries, difficulties in economic and technology, most of high standard online training products could be built with in-source programmers from Universities under the appropriate guidance and training. On the other hand, it will be suitable with the local learners in terms of learning tradition and skills without importing expensive software system from overseas.

One of the most important problems which can hinder the deployment of applied ICT in Open Learning in developing countries is the technology infrastructure and techniques. In part III of the report, strategic solutions in organizing system have been suggested by the author. These solutions ensure the feasibility of the development of ICT in Open Learning in developing countries.

To conclude, the author has suggested some recommendations to the Government, the Ministry of Education and Training on necessary policies supporting the development of applied ICT in Open Learning as well as mentioning the international and regional cooperation in this field.
Introduction
Information Exchange In Teaching - Learning Processes

1. Information and Knowledge

According to the point of view of Information Theory, Teaching and Learning is a complicated process of exchanging information. Learners receive input information (INformation), processing into knowledge (figure 1). Knowledge of learners is the product of Teaching and Learning processes, therefore knowledge can be seen as output information (EXformation) of Teaching and Learning processes.

![Figure 1: Teaching and Learning process](image)

The most basic aspect used to evaluate the efficiency and effectiveness of Teaching and Learning is the process of converting information into knowledge. Knowledge of learners is the product which can measure the successful of Teaching and Learning processes. If learners are provided with abundant information without proper organizing, supporting to the processing, then it information cannot become knowledge of learners.

Because learners are the subject to receive knowledge, product of Teaching and Learning processes, thus many educational theory have come to agree that “Learners are central of the Teaching and Learning processes”. Educational organization play a very important role, however they only support for learners: providing accurate and sufficient information, support processing information into knowledge.

Interactive Triangle in Teaching and Learning

In exchanging information of Teaching and Learning processes, three entities, which have contact to learners, appear to have very important impact to the effectiveness of Teaching and Learning as shown in fig 2.

- Learners interact Teachers
- Learners interact Classmates
- Learners interact Environment
Teachers: play major role in traditional education. Previously, teachers are the main and only source of information. On the other hand, teachers help and support learners in processing information such as guiding, explaining, tutoring, learning methods, decision making …

Classmates: in addition to teachers, supplement information as well as supporting in processing information: discussing, exercising… Especially, classmates are spiritually helpful: motivating, encouraging, competing and inspiring study of learners.

Environment: Besides Teachers and Friends, interactive between learners and the environment is also important in learning process. Firstly, environment can be understood as “institution”, the major roles of institutions are to arrange and to organize learners and learning process. In traditional education, selecting the good institutions is very much affecting the results of study.

To some extend, environment can be seen as the condition and situation of the society, physical location where learning process occurring. Environment can have impacts on input information, this has become obvious in modern society. For examples, beside of information come from Teachers and Classmates, learners can receive huge amount of information from society, community, public media, especially from real life information.

The contact between learners and other three entities is referred to as the interactive triangle of the learning process. The result of learning, effectively building knowledge for learners, heavily depends on this interactive triangle. Therefore, one can argue that the main target of Education Science - Pedagogy - is to continuously improve the interactive triangle in order to achieve the best criteria of Teachers, Classmates, and Environment for every specific context of Teaching and Learning.

3. Technical tools support learning

In lifelong learning society, study obviously cannot be done only within institutions, learners mainly have to self-study somehow. Self learners, other term is isolated learners, lack of three interactions mentioned above which is a big disadvantage. They often have to read, search information from books, newspapers and other media, self exercise… Interactive is infrequent
and only happen if someone shares the same interest in the fields of study. It often carries out by mails (in correspondence education)

Every period in history, people have continuously applied the newest results of scientific technology of recent period to establish tools and systems supporting Teaching and Learning, trying to create **virtual contact** in order to supplement, replace the role of Teachers, Classmates, and Environment in the processes of Teaching and Learning, for instance, using post office (learning through mails), telephones, radio, TV, radio cassettes, video cassettes, video conferences and modern Information Communication Technology.

The criteria of an ideal system supporting virtual contacts in Teaching and Learning (Virtual teachers, friends, and environment) are:

a. Multimedia: information can be communicated in variety of forms such as text, voice and sound, picture and animation, video

b. Two way and multi-way synchronous and asynchronous communication: information can be stored and retrieved

c. Equipment is small and flexible: easy to use, can be use anywhere at anytime

d. Low cost

With the invention of ICT, those ideal systems have been built and more improved in the last few decades. Recently, thousands of *virtual institutions, virtual classes* have been developed and the concept of “Lifelong learning, learning anywhere, learning anytime” have become reality in many developed countries. The new method of training with ICT support is called E-Training.

Many International and Regional Organizations in the field of E-training have been created and operated successfully. A great example in practicing E-Training is the **Independent Council for Distance and Home Education (ICDHE)** grouping hundreds of Universities, Institutions, and Organizations which carry out E-Training around the world. Among those, many institutions which are only running **E-Training** have been established in the last decade as well as many famous traditional Universities in the world.

**4. Condition to develop E-Training**

However, in order to develop E-Training in a country, there are four significant aspects must be considered:

a. **Technology infrastructure**: High speed, broadband Internet is popular to every areas with low cost compared to average people income of the home countries.

b. **Economic infrastructure**: Average living standard, people should be able to possess high technology ICT equipment.
c. *Intellectual capacity infrastructure*: People are used to operating ICT equipment and service with basic comprehension of information technology.

d. *Law and regulation infrastructure*: There should be a robust regulations and law to ensure the processes of online Teaching and Learning.

Those conditions is far too difficult to meet in the developing countries with poor technology infrastructure, low income, and most people are new to ICT equipments and services (especially in remote areas) and finally laws and regulations on E-Training are not presented.

Obviously, to develop E-Training in those countries, we cannot bring in the systems have been popularly used across developed countries around the world. On the other hand, to catch up and integrate with the world community, training and education demands in developing countries are very extensive and necessary compared to that from other developed countries. To cope with those demands, the only way is to strengthen IT application on E-Training.

Researching for a general strategy to develop E-Training in developing countries, including Vietnam, is a very essential requirement. To develop E-Training in developing countries, we must take into account the two main solutions: *Technology and Systematic Organisation*.

**Technological solutions**: Selecting appropriate technology suitable with the conditions and human skills of every country to start and gradually improve in order to meet standard of that in developed countries in the near future.

**Systematic Organisational solutions**: This is a very important aspect which can overcome the limitation technology, economic and intellectual conditions as well as effectively facilitating the technical solutions.

In following parts of the report, author is going to analyse the main aspects of those solutions.

### Technical Solutions

Technology is one of the main important tools in Training and Learning processes, especially in E-Training. The technical solutions come into two main categories: *Virtual University* and *Electronic Materials*. These solutions have been accomplished in E-Training among developed countries and have been improving recently with ICT.

However, as it is mentioned previously in the report, due to limitations in technology, economic in the context of developing countries we must select and bring together appropriate technology to create a simple, convenient system for users as well as easily upgrading to integrate with the world technology in the future. The following sections will describe the above solutions.

1. **Virtual University**

Virtual University is the place where most of Teaching and Learning processes are taking place. The role of virtual university in E-Training is similar to that of market space in E-
Commerce. In fact, virtual university is a Web Site (or collections of Web Sites) consisting of following sub-systems

**Introduction – Orientation:**

a. Introducing to students who want to know in details about university (fields, levels, types, methods of training, requirement of qualification, time condition, work condition, and finance … to enroll to courses). Introduction information can be presented using notice board, news, FAQ, email and/or auto-responder

b. Consulting students to select suitable fields of study as well as levels and methods depending on theirs specific conditions and desires.

c. Advertising and prevailing about university

**Student Gateway and Management:**

a. Guiding students register, enroll to courses using predefined application forms

b. Organising and managing students information

c. Supervising learning processes and the results of students.

d. Providing necessary papers such as recommendations, results, certificates and qualifications

e. Connecting with Accounting system for payment

**Communication and Delivery:** (main sub-system with important functions)

a. Noticing contents, schedules of courses

b. Displaying and supervising class schedules

c. Delivering lecture notes, working exercises, exam papers, guide-line and tutorials

d. Frequently making contact with students using chat room (synchronous) and forum (asynchronous)

e. Carrying out evaluations and exams.

**Accounting and Finance:** Following students payment and other fees

Once students access fully functional Virtual University, they feel as if they are directly studying and socializing in the traditional University. Students can meet teachers, friends, and administrators. They can communicate, discuss one another, listen to lectures and explanations of exercises and most of all they are related to the University.

*Virtual University is an ideal environment which helps to reduce the lonely feeling of isolated students.* Especially for those who enroll in distance education far from teachers, friends, and institutions.
2. **Electronic Materials**

  Printed books and materials are indispensable for self learning or distance learning, even with the help of recent tools and technology. However, printed materials, as well as others tools and technology except ICT, can only deliver information in one way and with limited media such as text and static pictures or graphics.

  New tools and technology has brought big changes in electronics materials (e-books) overcoming the limitations of printed materials. E-books are able to create two-way communication (human-computer). Additionally, information can be exchanged in variety of forms such as voice, sound, animation, and video. Other advantages of e-books are small - they can be stored on handheld devices to carry around - and cheaper than printed materials.

  A fully functional electronic material consist of: Introduction to subject, lecture notes, revises questions, exercises, self checking exercises. Information is presented in the forms of text, pictures, and graphics as well as appropriately combining lecture voice and using video to lively illustrate exercises.

  However, multimedia contents using in online materials on Web Sites must be considered due to bandwidth and speed of internet connection. For application running on stand alone computer or local network, we can use high capacity multimedia contents. For user convenience, except main contents of materials on CD or VCD, programmers and producers should provide adequate programs to run application if necessary. Users can set up programs on their computer in case they are not ready provided.

3. **Internet Tools and Technology**

  Virtual university and electronic materials are the two main solutions to E-Training and they are built based on computer networking and Internet. Network applications can be developed by using many different tools and technologies. The right choices will have great affects on specific application in terms of effectiveness and efficiency.

  Presently, there are two major technologies from Microsoft and Sun dominated the networking market. Sun provided a specification on Java 2 Platform, Enterprise Edition (J2EE) aiming on high end UNIX computers and mainframes whereas Microsoft has developed a package products and tools on Windows NT platform targeting PC.

  In the context of developing countries, fully package products from Microsoft is suitable and easy to deploy such as Windows 2003 Server (Advanced Server, Data Center Cerver), SQL Server, Site Server, Exchange Server, Biztalk Server, Application Center, Internet Information Services and Active Server Pages.

  Microsoft continuously updates and produces new products and technology which facilitate the development of E-Training such as Mobile Information Server, .NET framework. This makes use of programmers from wide range of languages.
However, in specific situations of developing countries, another option is to apply similar products from other third vendors. Using other products avoid heavy packages as well as reducing the cost. Programmers must consider applying components from other providers. Before final deployment, they should be test and evaluate to ensure the compatibility with overall general solutions.

Robust networking deployments are not easy to build. Many issues arise such as scalability, maintainability, reliability, security, cost and more. Therefore, successful deployment heavily depends upon technology and people building systems.

4. Skilled Human Resources

In general, the levels of technology and economics in developing countries are still low. However, it is not the most challenge factor because with sufficient budget (not too large) new technology equipment will be supplemented and upgraded quickly. The biggest barrier, which cannot be overcome in a short period, is skilled labour.

In order to create a Virtual University, there is a need of skillful programmers and administrators who can carry out important tasks as follow:

a. Web Site designers: design structure, content, and style
b. Webmaster: manage overall functions
c. Sub system administrators
d. Forum administrators, moderators, online tutors

Constructing electronic materials also cannot be done by a professional teacher or a programmer. It requires specific skilled workers including:

a. Redactor: in charge of contents and information of every single subject
b. Scenario designers
c. Programmers
d. Material Producers

Recently, people involved in E-Training in developing countries are not well professionally and systematically trained. Most of them are working and learning from experiences. Therefore, the author has recommended establishing complete training fields on Electronic Education and Online Instructional to cope with the great demands on human resources.

Systematic Organisational Solutions

Together with the underdeveloped technical infrastructure, there are also other big disadvantages which obstructed the possibility of developing E-Training in developing countries. First, the problem of low people’s cultural standard: People - Learners - have not enough
knowhow and the habits of getting in touch and of using ICT equipments and services. Second, the financial problem: The average income of the population is too low compared with the cost for using these equipments and services.

Besides, with the technical solutions mentioned in Part II, the author proposed a group of feasible systematic - organizational solutions in order to overcome previously mentioned disadvantages in developing countries.

a. **Socialization of the dissemination of IT fundamental knowledge**

Many countries, every year on summer holidays, is organising the movement of student-volunteers contributing to the development progress of the society. Many organizations of youth and students mobilized their members for moving in remote countryside and mountainous regions - some international organizations even send their member-volunteers to other undeveloped countries in order to participate to “campaigns” of teaching to illiterate population or of knowledge dissemination: general knowledge of hygiene and medicine, of environment protection etc.

Since the last summer of the school year 2003-2004, answering to the appeal of the Vietnam Student Association and the Vietnamese Youth Federation, many groups of student-volunteers from Technical institutions in all around the country have run a pilot project of teaching general IT knowledge for young people in the remote countryside and mountainous regions in some weeks time.

Based on the good experience of this project, the movement will be certainly developed with larger scale in the next future. To create a “E-learning Learner environment” the Vietnamese government will be able to rely on the contributions of social organizations: Vietnam Student Association, Vietnamese Youth Federation, Vietnam Woman Association, Vietnam Association of Science and Techniques, Vietnam Association of Information Processing etc. These non governmental organizations can motivate their members for running many campaigns of IT knowledge dissemination for people in remote countryside and undeveloped mountainous region. Through these campaigns the population will have opportunity to step by step make acquaintance with ICT equipments and services.

For instance in the condition of Vietnam, if every year some 100-200 groups of volunteers (each group with 2-3 members) can be mobilized, then only in a 2-3 years time the use of ICT equipments and services will be widely popularised in around the country. Having had such elementary knowledge, many people will be not at fault in contact with ICT service and later with E-learning.
2. The Local Tutorial Center Network

Formerly (and also presently) in Distance Education, to enhance the interactive between Institution, Teacher with Learner, Institutions running DE always organized many tutorial centers in different regions. From time to time, every month or every term, institutions send teachers - tutors (or recruiting local tutors from the same region) to the centers. The centers then grouped all learners in the region for attending face-to-face session animated by tutors.

In E-Training, we can supplement necessary equipment to these regional tutorial centers to upgrade into a Local Tutorial Center Network which will be an effective complement to the Virtual Institution.

The Center will be equipped with some LANs, each with some 20-30 users and a powerful server, linked with Internet by ADSL or high speed cable. Learners who have no personal computer or who cannot connect to Internet at home will be able to arrange their own timetable coming to work at the Center.

At the user PC, learner can work by online high speed contact with the Virtual Institution and will have to pay lower fee compared with the use of dial-up connection at home. The Center can also download the sub-systems of Virtual Institution and learner can work offline with the server of the Center. All interactive will be proceeded in the LAN with high speed and high reliability and without Internet fees.

In the server of LAN the Center can also post many E-materials provided from the Institution for the choice for use of Learners (of course, these materials are much richer in contents than those posted on Website). The creation of such Network of Local Tutorial Centers can have many advantages as follow:

1. Providing free equipment for poor learners
2. Providing Interactive services with low cost for learners
3. Providing to Learners opportunity not only contacting with the Virtual Institution but also using easily the rich system of E-materials.

At the present time, in Vietnam there is a system of Centers for Continuing Education (CFCE) located at every province and district in all around the country. This system of CFCE is supervised by the Department of Continuing Education (DOCE) at the MOET. These CFCEs are assigned by MOET in charge of the management of non formal training, on-the-job training, and part time training in each and every region.

If the regional authority could provide equipment to CFCE, supply to their staff with ET experts, a CFCE would be able to take in charge of a common Local Tutorial Center for many different Virtual Institutions in a region: The management fees for Virtual Institution will be shared among many institutions and the geographical distance from learner to institution will be considerably shorter.
In previous researches, the author has proposed a system of regulations for the co-operation and the co-ordination between the managers of Institutions which are running DE and the Managers of CFCE in ET.

3. Examination and Evaluation in ET

The last problem we have to examine is the system of evaluation and examination for learners at the end of each course trained by ET. We can distinguish two target groups attending evaluation.

For a group of many learners, the goal of their study is only to gather knowledge and skills. They do not require any kind of certification or degree, for them the examinations are done only for verifying their real fruits of the learning process. With these learners, beside of the exercises, auto-evaluation tests already available in each E-material, the Virtual Institution can organize regular online exams. The learners - candidates - log in the website of Virtual Institution for attending exam (anywhere they can get Internet connect) and the exam result will be informed to candidate online or through E-mail if necessary.

Similar exams can be also organized at Local Tutorial Centers (LTC), using the exam subject bank available in the Database of Virtual Institution (and of the server at LTC). Candidates make their tasks on PC and send directly to Virtual Institution or they can also prepare hardcopies, then the LTC will collect and send to the Institution (by mail) for evaluation. With another group of learners, Certificates, Diplomas and Degree are indispensable for them after finishing a course. In these cases the exams have to be organized in gathering the candidates in each region at LTCs. The role of LTCs in these exams is only for checking the identity of candidate and controlling examination regulations.

The subjects of each exam are sent directly from Virtual Institution to the PC of each candidate, exam tasks will be sent back to Virtual Institution (softcopies) or the LTCs will collect exam papers (hardcopies) and send them to the Institution.

This form of organization assures all demands of accurate exams and at the same time cut down fees and time for transportation to candidates.

CONCLUSION

E-Training is an inevitable change in Education and Training in this century, the century of Information Technology. Not only applying for Open Learning and Distance Education, it is increasingly taking place in all Teaching and Learning process with its effectiveness.

Deployment of E-Training requires technical infrastructure and professional trained human resources in terms of management and operation. On the other hand, different from traditional education, learners must understand and frequently use ICT equipments and services. These
conditions are the main barriers which hinder the deployment of E-Training in developing countries.

In this paper, author has recommended a system of general solutions, technical and systematic organisation, in order to overcome the basic obstacles. This contribution, with the purpose, is to facilitate the deployment of E-Training quickly among developing countries, including Vietnam.

Some of ideas in this paper have been deployed in a pilot project building Virtual University, FITHOU CYBERSCHOOL, at the Faculty of Information Technology, Hanoi Open University since 2002 – 2003. After two years trial, practical results are encouraging. In 2004-2005, those results have been extended to contribute in a Scientific Research Project: “Research on applied ICT in Distance Education”, organized by Ministry of Education and Training of Vietnam.

To be able to practice E-Training, the most important factor is to draw attentions from Governments, especially the awareness of Education and Training Management Organisations in term of the role and capability of E-Training. It must be thoroughly consider applying to the country’s system of Education and Training.

In the year 2003 – 2004, UNESCO – PROAP (Asia Pacific Region) has grouped some Universities and Institutions in the region to carry out a pilot project: “Pilot Project of the Virtual University in the Great Mekong sub region” including Hanoi Open University, Vietnam – SukhoThai Thammathirat, Thailand – Yunnan Teacher Training College, China – Radio Television University of Yunnan, China. Attending the project there are also members of Ministries of Laos, Cambodia, Myanmar with the participant of UNESCO specialists from Australia and France etc.

Even it was only a pilot project in small scale (training only one certificate in Tourism), however this is an invaluable experience starting the International cooperation in the field of E-Training among developing countries with the support from other part of the world.

Hoping that with the awareness and sufficient concerns of Governments and with the cooperation of experienced educational specialists, scientists around the world, E-Training will be quickly grown contributing to the socio-economic development in developing countries on the way moving toward integration with the world community.

References


DANIEL PERAYA & CLAUS HASSIG. Conception et Production de matériel d’enseignement à distance. Université de Genève. 1993


DON JONES - NET E.Commerce Bible. Hungry Minds Inc.2002

NGUYEN THANH THUY. Trí tuệ nhân tạo (Artificial Intelligence) Nhà xuất bản Giáo dục - Hà nội 1997

THAI THANH SON. IT and the development of Distance Education and Open Learning at the coming century - Needs and Perspectives. Keynote address at the International Conference: “Co-operation and Development” - Hanoi 1996


THAI THANH SON. The role of ICT in Distance Education & Open Learning at the digital era in Vietnam. AAOU 16th Annual Conference - Seoul 2002


THAI THANH TUNG. Some Advantages when using COM components for structuring websites used in On-line training. Report at International workshop. Center for Instructional Technology - Utah State University - USA 2002

THAI THANH SON & THAI THANH TUNG. The use of ICT in Distance Education - HOU - a case study. UNESCO International Conference on On-line training, Shanghai - China 2003

THAI THANH TUNG. Pilot Project of On-line training at FITHOU. Hanoi Open University- Annual scientific conference March 2003
THAI THANH TUNG. E-Commerce and Network programming. FITHOU Press - Hanoi – 2004