International Journal of Education and Development using Information and Communication Technology

Volume 2, Issue 2 May-June 2006

Communication and education using ICT

Chief Editors:

Stewart Marshall
The University of the West Indies, Barbados, West Indies

Wal Taylor
Cape Peninsula University of Technology, South Africa

IJEDICT Sponsoring Organizations:

The University of the West Indies Distance Education Centre, West Indies
and
Cape Peninsula University of Technology, South Africa

Published online by:

The University of the West Indies Distance Education Centre, West Indies

IJEDICT url: http://ijedict.dec.uwi.edu

ISSN: 1814-0556

Editorial Team

Copyeditors:

Layout Editor and Proofreader:

Technical Support:

Reeve Ramharry, The University of the West Indies, Trinidad & Tobago, West Indies;
Howard Smith, The University of the West Indies, Jamaica, West Indies.

Open Access Policy

This journal provides open access to all of its content on the principle that making research freely available to the public supports a greater global exchange of knowledge. Such access is associated with increased readership and increased citation of an author's work. For more information on this approach, see the Public Knowledge Project, which has designed this system to improve the scholarly and public quality of research.

Archiving

This journal utilizes the LOCKSS system to create a distributed archiving system among participating libraries and permits those libraries to create permanent archives of the journal for purposes of preservation and restoration.

Publication Frequency

There will be five issues of IJEDICT per year, in a continuous publication cycle. Articles will be published immediately in the current issue of IJEDICT on completion of the review/editing process.

Publication Classification Details

Key title: International journal of education and development using information and communication technology
Abbreviated key title: Int. j. educ. dev. using inf. commun. technol.

ISSN: 1814-0556

About the journal

The International Journal of Education and Development using Information and Communication Technology (IJEDICT) is an e-journal that provides free and open access to all of its content.

Regional economies and communities are facing increasing economic, social and cultural hardship in many parts of the world as economies adjust to the demands of the new orders of commerce and governance. A part of this is the paradox that regional economies and communities can be either enhanced or disadvantaged by information and communication technologies (ICT) products and services. The potential enhancement comes from the increased social, economic and cultural capital that comes from harnessing ICT products and services in a community sense. The disadvantage comes from the power that ICT products and services have in centralizing commerce, service provision and governance away from the regional community.

Unless we get a greater level of access AND adoption of information and communication technology (ICT) for education and development at community level, we will miss the opportunity to turn the "digital divide into a digital opportunity for all, particularly for those who risk being left behind and being further marginalised" ("Declaration of Principles", WSIS-03/Geneva/Doc/4-E, Principle 10). The International Journal of Education and Development using Information and Communication Technology (IJEDICT) is an e-journal, with free and open access, that seeks to address this issue.

IJEDICT aims to strengthen links between research and practice in ICT in education and development in hitherto less developed parts of the world, e.g., developing countries (especially small states), and rural and remote regions of developed countries. The emphasis is on providing a space for

researchers, practitioners and theoreticians to jointly explore ideas using an eclectic mix of research methods and disciplines. It brings together research, action research and case studies in order to assist in the transfer of best practice, the development of policy and the creation of theory. Thus, IJEDICT is of interest to a wide-ranging audience of researchers, policy-makers, practitioners, government officers and other professionals involved in education or development in communities throughout the world.

Coverage

IJEDICT has a major emphasis on the use of ICT in education and development in hitherto less developed parts of the world. The journal includes descriptive case studies about ICT projects in developing countries and in rural and remote regions of developed countries, as well research articles evaluating such projects, developing policy or creating theory. Topics covered include, but are not limited to, the following areas:

Community informatics and development in remote, rural and regional areas;
Developing regional industries (e.g., agriculture, tourism) with ICT;
E-Commerce and Business in remote, rural and regional areas;
ICT for micro, small and medium enterprises;
ICT in local governance;
E-Democracy;
ICT and social marketing;
ICT enabled healthcare for remote, rural and regional consumers;
Social epidemiology and virtual communities;
Education: distance, e-learning, flexible learning and delivery, open learning, e-literacy.

Notification of new articles

Sign up to receive regular notification of new IJEDICT issues and articles at:
http://ijedict.dec.uwi.edu/notification.php

Call for Papers/Articles

IJEDICT comprises: a "research articles" section for academic, peer-reviewed articles; a "studies from the field" section for edited (but not peer reviewed) case studies; a "project sheets" section for brief descriptions of relevant projects; a "notes from the field" section for working papers, and other commentaries on relevant topics; and, a "book/media review" section for book, software and other media reviews.

The Editors welcome submissions at: http://ijedict.dec.uwi.edu/submissions.php

Section Policies

Refereed Articles

This section contains articles that have been reviewed by at least two academic peers in a process that ensures that authors and reviewers remain unknown to one another. To be included in this section, articles must be based on research and scholarship, and contribute "new" and significant knowledge to the field of ICT for education and/or development. Reviewers for research articles are selected from the Editorial Board, the Review Board and the Peer Review Panel.

Book/Media Reviews

This section contains editorially reviewed reviews of books that are relevant to the use of ICT in education and/or development.

From the Field

This section includes editorially reviewed case studies (2000-5000 words) of the use of ICT in education and/or development.

Invited Articles

As the name suggests, "Invited Articles" are ones specially requested by the Editors. Generally, they are editorially reviewed.

Project Sheets

This section includes brief descriptions (500-1000 words) of education and development projects that utilise ICT.

Notes from the Field

This section contains short comments or notes that are useful for practitioners working in the field of ICT in education and/or development.

Editorial

This section contains the editorial written by the editors for the specific issue.

Submission of Articles

Authors can upload their papers, as well as data sets, research instruments, and source documents through the journal's Submissions section. They can submit their papers, figures, and appendices in a variety of file formats, including Microsoft Word, WordPerfect, or RTF (Rich Text Format).

Registration and login are required to submit items online and to check the status of current submissions.

Author Guidelines

General Information

- Submissions are invited for all sections of this journal. Refereed articles should be between 3,500 and 6000 words in length. Project descriptions for the "Project Sheets" section should be between 500-1000 words in length. Submissions for other sections of the journal can be any length.
- Submissions can be in Microsoft Word, Rich Text Format (RTF), equivalent Open Source document file format, or HTML format.
- Please use Arial 12-point font for the Title, which should be in bold "title" (upper and lower) case.
- Use Arial 10-point font for the remainder of your article.
- First level headings should be in bold uppercase, and second level headings in bold "title" (upper and lower) case.
- No footnotes please - instead use endnotes.
- Photographs, maps, diagrams and other audio-visual aids are encouraged. Please include these in the text where and as they should appear. Please provide images in gif or jpeg formats.

Abstracts

Please provide an abstract of approximately 100 words. The abstract should be included with the rest of your article in the submission file, but it should also be copied into the appropriate text box during the on-line submission process.

Biography

Please supply a short (100 word) biography for each author. This should include the name, rank, institution, institutional address, and email address. Do not place the biography in your submission file but copy it into the appropriate text box during the on-line submission process.

Style

Submitted manuscripts must be written in the Harvard editorial style:

- References should relate only to material cited within the manuscript and be listed in alphabetical order, including the author's name, complete title of the cited work, title of the source, volume, issue, year of publication, and pages cited. See the following examples:

  Marshall, S. (1991), "A genre-based approach to the teaching of report-writing". English for Specific Purposes, vol. 10, no.1, pp. 3-13.

  Taylor, W. & Marshall, S. (2002), "Collaboration: the Key to Establishing Community Networks in Regional Australia", Informing Science, vol. 5, pp. 155-162.

  Marshall, S., Taylor, W., & Yu, X. (eds.) (2003), Closing the Digital Divide: Transforming Regional Economies and Communities with Information Technology, Greenwood Publishing, Westport CT.

- Citations in the text should include the author's name and year of publication where you use the source in the text, as in the following examples:

  In this way, information technology can be seen to effect and influence changes in organisational structure (Orlikowski & Robey 1991).

  Edwards (1995, p.250) views the globalising of distance education as "invested with the uniform cultural messages of modernity".

  Globalisation, especially in relation to open and distance education, will reduce the tolerance of difference and so "how can local issues and contexts be addressed?" (Evans 1995, p.314).

- Further information about the Harvard editorial style can be found at:

  http://lisweb.curtin.edu.au/referencing/harvard.html
  http://www.library.uwa.edu.au/guides/citingsources/harvard.html

Copyright Notice

Privacy Statement

The names and email addresses entered in this journal site will be used exclusively for the stated purposes of this journal and will not be made available for any other purpose or to any other party.

Principal Contact and Mailing Address

Professor Stewart Marshall
Managing Editor, IJEDICT
The University of the West Indies Distance Education Centre
Cavehill Campus, Bridgetown, BARBADOS, West Indies
Phone: (+1 246) 417 4497; Fax: (+1 246) 421 6753; Email: stewartmar@gmail.com

Table of Contents

International Journal of Education and Development using Information and Communication Technology (IJEDICT), 2006, Vol. 2, Issue 2, pp. 2-3.

Editorial: Achievements and challenges for ICT in education and development

Stewart Marshall
The University of the West Indies, Barbados, West Indies

Wal Taylor
Cape Peninsula University of Technology, Cape Town, South Africa

Welcome to Volume 2, Issue 2 of the International Journal of Education and Development using Information and Communication Technology (IJEDICT) - an e-journal that provides free and open access to all of its content. This issue deals with achievements and challenges for ICT in education and development, and brings articles from and/or about India, Australia, USA, Greece, Jordan, Turkey and Malaysia.

"Community radio and emerging information networks" by Ruchika Negi takes a closer look at the workings of five community radio groups operating in the northwestern hills of Uttaranchal in India. The author introduces and analyses the processes and the experiences of the local volunteers in doing radio amidst their own community members. The author suggests that such initiatives, small and scattered as they may be, help in the creation of knowledge networks that help to form newer, hitherto unexplored spaces of dialogue and discourse. The article "An information technology enabled Poultry Expert System: Perceptions of veterinarians and veterinary students" by Thammi Raju and Sudhakar Rao, also comes from India. This article describes a Poultry Expert System (PES) that was developed using Visual Basic 6.0 and MS Access on selected dimensions of poultry farming. Its efficacy was tested among the veterinarians and veterinary students. The study concludes that PES is an IT enabled tool for faster dissemination of expert advice in multiple locations at the same time.

The Australian government funded various ICT programs throughout regional Australia through its Networking the Nation (NTN) program. In their article "The CTC@NSW Program: Achievements and ongoing challenges" Lynne De Weaver and Allan Ellis describe one such program. Although the business planning process was an integral part of what communities had to do when they applied for a CTC@NSW grant, community inputs and outcomes regarding this process were not fully evaluated in the CTC@NSW program's Final Report. An independent online survey was subsequently designed and conducted by the first author and revealed that the business plan that was a major component of the application was a key determinant as to the success or failure of the CTCs that responded to this survey. Also from Australia, in their article "Releasing the pedagogical power of information and communication technology for learners: A case study", Cecily Knight, Bruce Allen Knight and Daniel Teghe explore two issues, firstly, what are the barriers to educators embracing the new technologies, and secondly, what role do teacher education programs play in breaking down the barriers. In discussing these issues, initiatives being undertaken in Queensland are highlighted.

Early pioneers in agribusinesses and colleges of agriculture are now utilizing elearning methods as a major part of both their education and strategic management programs. In "Trends and challenges of eLearning in national and international agricultural development", John Leary and Zane L. Berge explain the major trends in elearning in agriculture and the challenges of elearning in agriculture. Their article describes the major developments and uses of elearning in the field of agriculture and investigates the international opportunities with elearning in agriculture.

"Long distance training for rural women craft producers" by Margaret Perivoliotis-Chryssovergis describes a Hellenic distance learning/e-learning pilot study, focusing on women in remote or rural areas who are professionally or occasionally occupied with the production of artefacts, mainly textiles, without having any education in design, informatics, marketing or management, due to their residential location and life-style constraints. A special educational module was developed using ICT to teach fundamental design education, computer training, and basics on management and marketing to rural women.

Ruba Fahmi Bataineh describes a study that investigated 210 Jordanian EFL perceptions of their computer literacy in the article "Jordanian EFL students' perceptions of their computer literacy". The findings revealed that the majority of the students reported being fairly proficient to proficient in computer skills such as deleting files, copying files, formatting a floppy disk, and installing a program on a hard disk, while most reported being not or a little proficient in computer skills such as using images from a camcorder or digital camera in computers, using PowerPoint, and creating databases. The results further revealed no significant effect for gender but a significant effect for year of study on students' perceptions of their computer literacy.

In "Exploring Turkish science education faculties' understanding of educational technology and use", Hakan Turkmen reports the results of a survey that determined science education faculty members' attitude toward computer use. Two educational perspective themes concerning the knowledge of science education teachers converge in this study: science education faculty members' current knowledge and desired knowledge of understanding of educational technologies and use. The findings of this study showed that Turkish science education faculty members relatively unfamiliar with the advantages of educational technology and do not maximize its use, but they want to know the advantages of educational technology.

The article "The utilization and integration of ICT tools in promoting English language teaching and learning: Reflections from English option teachers in Kuala Langat District, Malaysia" by Robinson Joseph Samuel and Zaitun Abu Bakar, examines the present scenario of English language teachers as regards ICT integration and tries to determine if the ICT skills of the teachers are adequate to promote English language teaching and learning. The authors also look at some of the obstacles faced by English language teachers in ICT integration and finally in the concluding part the researchers suggest the use of interactive lessons to speed up the teaching and learning of English.

IJEDICT provides open access to all of its content on the principle that making research freely available to the public supports a greater global exchange of knowledge. In this way, IJEDICT seeks to support the community of researchers and practitioners involved in ICT for education and development, and we welcome feedback and suggestions as to how the journal can better serve this community.

Stewart Marshall and Wal Taylor
Chief Editors, IJEDICT

International Journal of Education and Development using Information and Communication Technology (IJEDICT), 2006, Vol. 2, Issue 2, pp. 4-14.

The utilization and integration of ICT tools in promoting English language teaching and learning: Reflections from English option teachers in Kuala Langat District, Malaysia

Robinson Joseph Samuel
Retired College Lecturer, Malaysia

Zaitun Abu Bakar
University of Malaya, Malaysia

ABSTRACT

The unprecedented advances in interactivity and multimedia capabilities together with a myriad of emerging technologies have enabled the creation of virtual learning environments that could be utilized to boost the development of English language skills among Malaysian primary and secondary school students. English language standards have been deteriorating over the years and basic oral skills have been appalling due to lack of usage and reflective practice. English lessons that incorporate multimedia applications can exert powerful motivation and provide bored students with exciting new ways to learn. The utilization and integration of ICT tools can indeed assist students in acquiring English Language competency as well as enhance the quality of their learning experience. This paper first examines the present scenario of English language teachers as regards ICT integration and tries to determine if ICT skills of English language teachers in the light of existing infrastructure facilities are adequate to promote English language teaching and learning. The researchers next look at some of the obstacles faced by English language teachers in ICT integration and finally in the concluding part the researchers suggest the use of interactive lessons to speed up the teaching and learning of English.

Keywords: *interactivity, multimedia elements, rich learning environment*

INTRODUCTION

There is growing concern about the level of English proficiency at the workplace which if left unchecked could lead to the country losing its competitiveness especially in the industry and technical fields. Malaysia needs communicative competence to maintain its competitive edge in all aspects of our economic environment be it administration, education, trade or finance. The 2004 School Certificate Examination Report on English Language 2 revealed that the majority of the candidates have yet to master the writing skills in English (Laporan Prestasi SPM, 2004). What is amiss? Can the right ICT tools enhance English language teaching and learning and quickly arrest the rapid decline? ICT tools have now removed the time and space limitation found in traditional teaching. Classroom dialogue can now extend beyond the time and space constraints of class time (Frayer, 1997). Carmen et al., (2003) say that integrating ICT tools in teaching can lead to increased students' learning competencies and increased opportunities for communication. Key findings under ImpaCT2 (www.becta.org.uk) show that the use of ICT tools in teaching and learning has positive effects on behaviour, motivation, communication and process skills and that it enables pupils to learn more autonomously. ImpaCT2 further shows that teachers in schools where pupils used ICT in English achieved higher mean gain scores. The integration of ICT tools in the teaching and learning of English have found to bring other benefits too. Besides motivating pupils and raising self-esteem and confidence, ICT can enhance pupil interaction, verbalization and involvement in collaborative learning (SIIA Report – 2000). What is

the scenario on the utilization and integration of ICT tools among English option teachers in Malaysia? Can similar benefits be achieved here in Malayia? In order to answer these questions a qualitative study was carried out to find out the extent of ICT integration among 30 English language teachers in Kuala Langat District in Selangor.

METHODOLOGY

The sampling frame of study was primary and secondary school teachers in three premier schools in Banting. Over a period of six months (i.e., July to December 2005), the researchers conducted face-to-face, semi-structured interviews with 30 trained teachers from three schools namely Sekolah Kebangsaan Sri Langat, Sekolah Menengah Kebangsaan Teluk, Panglima Garang and Sekolah Menengah Sultan Abdul Samad, Banting. Prior to the interviews, the researchers visited the above three schools and obtained useful information pertaining to infrastructure facilities. Each school has 2 computer laboratories with 25 desktop computers in each lab that are networked to a central server. Broadband internet access in the form of School-Net is available. Printing facilities are only available for teachers. Besides these, each school has on an average 19 notebooks and 10 LCDs and display screens.

Seven interview questions brought a wealth of information which the researchers have consolidated into one research article. The seven interview questions that were asked are as follows:

- Are there adequate infrastructure facilities in your school to support ICT integrated activities?
  If adequate, please mention the facilities.
  If inadequate, please mention facilities that are lacking.
- If infrastructure facilities are improved would you carry out more ICT integrated activities?
- Have you conducted ICT integrated lessons in 2005?
  If yes, mention the tools used.
- Have you attended any computer course before?
  Please give details.
- Do you possess sufficient ICT skills to confidently carry out ICT integrated activities in class?
  If the answer is negative, please mention the skills that you need.
- What obstacles do you face in carrying out ICT integrated teaching and learning activities?
- Is the school administration supportive in your endeavour to utilize and integrate ICT tools in teaching and learning activities?

The researchers chose the above three schools in Kuala Langat District in Banting on the basis of accessibility. The district education officer located in Banting is familiar with one of the researchers and hence it was not a hassle to obtain permission to interview and observe the English option teachers in these three schools. However, prior written permission from the District Education Officer was still necessary. Semi-structured, face-to-face interviewing was chosen as it was found to be the most appropriate strategy because of the intense nature of the topic under scrutiny. Semi-structured interviews are formal verbal questionnaires and they comprise a series of questions designed to elicit specific answers on the part of the respondents (Fraenkel & Wallen, 2000). Real-life examples provide illustrative evidence rather than the basis for testing hypothetical deductions needed in the formation of theory (Sirotnik, 1989). Each interview with the selected respondent was scheduled to last approximately one hour to allow a thorough examination of the ICT tools used in the teaching and learning of English. The interviews were carried out using a set of open-ended questions that were organized into a questionnaire. Time was further spent on observing how the respondents carried out their daily routine teaching and learning activities in the class. The interviews were recorded and later transcribed.

RESULTS

The seventeen themes that emerged from the responses to the seven interview questions are tabulated in Table 1. The researchers have classified the seventeen themes into six areas for further consideration.

Table 1: *Respondent Themes*

No	Area	Respondent Theme
1	Infrastructure Facilities	▪ Insufficient computer laboratories and poor maintenance. ▪ Desktop computers installed with archaic operating systems. ▪ SchoolNet (Broadband) connection often erratic ▪ No central database - still file processing system is used. Server shutdown after 'school hours'. ▪ No Learning Management System used. Smart School Management System (SSMS) still in testing stage. ▪ Computer facilities for teachers – limited; many PCs and Notebook computers are not functioning well
2	Computer Courses	▪ Insufficient courses and training ▪ Many have not attended any computer course at all
3	ICT Skills of Teachers	▪ Generally poor ▪ Request for more training
4	ICT Integrated lessons	▪ ICT integration rarely carried out ▪ Teachers are generally ignorant of ICT integrated and interactive lessons and quizzes in the web.
5	Supply of Courseware by MoE	▪ Many CD-ROMs have been supplied but rarely used by teachers
6	Obstacles	▪ Laboratory coordinator not skillful in solving simple PC problems. ▪ Poor support from school administrators ▪ Negative attitude of teachers ▪ Administrative burden – many tasks still manual

Infrastructure Facilities

Insufficient Computer Laboratories and Poor Maintenance

Almost all the respondents indicated that the computer laboratories in the school are inadequate. Presently, there are two computer laboratories which have networking facilities and are connected to a central school server. This means that at any one time only two classes can carry out ICT integrated activities. The computer labs are heavily booked and many teachers get frustrated for not being able to gain access to the computer laboratories. What is more alarming is

the fact that out of the 25 desktop computers in each lab only 15 of them are in proper working condition. As one SK Sri Langat teacher stated,

> *Everytime I on the computers in the lab, it hangs and it takes hell-of-a long time to come back to its normal operating mode.*

Maintenance is poor and allocation of funds from the Ministry of Education is rather slow. On the question of increased ICT integration with improved infrastructure facilities, two-thirds of the informants said that they were not sure and another one-third were reluctant to comment on this matter. Two comments supported this perception:

> *I'm not sure at this point of time. I face many constraints… I don't like to say anything on this matter.*

Desktop Computers Installed with Archaic Operating Systems

Approximately two-thirds of the informants specifically mentioned that 10 computers in each lab have been installed with Windows 98 Operating System. The implication of this is that the CD-ROMs supplied by the Technology Division of the Ministry of Education cannot be 'opened or run' as the programmes contained in the CD-ROMs have been made using Windows 2000 operating system. The number of English multimedia teaching-learning materials in the form of CD-ROMs developed by the Educational Technology Division and 'Syarikat Telekom Smart School Sdn. Bhd.' and distributed to the 88 existing Smart Schools is shown in Table 2.

Table 2: *Teaching Learning Materials*
(Educational Technology Division Report, 8th March 2004 – http://www.moe.edu.my).

Subject	Percentage of Syllabus Covered	Number of Software Produced
English Language	80%	408

If this sample is taken to be representative of a typical school, then this revelation indicates that the multimedia CD-ROMs which contain interesting and interactive English lessons are not being used by hundreds of schools and they become white elephants and just being stored in steel cabinets. One SMK Sultan Abdul Samad teacher spoke candidly, *I tried to open the CD-ROMs but in vain. I'm fed-up.* What a waste! Some allocation of funds is necessary where the school administrator could use his discretion to repair or change the operating system quickly without adhering to bureaucratic procedures.

SchoolNet (Broadband) connection often erratic

One-fourth of the informants asserted that the broadband access is not consistent and on certain days there is no internet service. The school servers are frequently attacked by virus and there is a need for GITN Sdn. Berhad (Government Integrated Telecommunications Network) to block the virus before they enter SchoolNet. In addition to this, the existing cabling and wiring cannot take the full load of electricity when all the computers are on at the same time. One Sri Langat teacher commented, *Very often the SchoolNet is down. I'm fed-up with the quality of their service.*

No central database

All the informants noted an absence of a central database in their schools. The establishment of a database is vital where all data is integrated and stored. All departments can access the information in a database according to their needs. Students with low English proficiency could be identified in a split second and remedial measures could be initiated. One-third of the respondents say that their computer laboratories are not networked to a central server. This is quite a sizable number and this means the potential gains that can be derived from a school

intranet have not been exploited. What is even worse is that the school servers are shutdown after school hours and therefore the servers only play a limited role. If a school has developed a range of resources based on a particular theme, then there may be many opportunities for that content to be shared with other schools through intranets (Heppell, 1999). Almost all the responses noted that 'File Processing System' is still widely practiced in all the three schools. Teachers store their data either in diskettes or in 'thumb drives'. Every time a department official wants information about teachers, he sends a form to schools and asks teachers to fill in their particulars. The Ministry officials can easily extract information about teachers if there is a central database. Teachers frequently complain that they have to fill in their personal particulars several times in a year. The following views exemplify these feelings,

I am fed-up of filling up my particulars so many times in a year.

No Learning Management System

On the use of Learning Management System, virtually all the informants noted that they have not used a Learning Management System before. This indication is not a healthy sign as a LMS can not only help to reduce the administrative burden of teachers but it can help to monitor and track the individual progress of students. Besides these functions, a typical LMS has special classroom features such as discussion forums, calendars, and "chat rooms" where participants can communicate in real time with each other. Currently only about 50 'Smart Schools' are using the Smart School Management System (The Smart School Bulletin, 2005). The *SSMS* has four main modules namely the Attendance, Lesson, Co-curriculum and Timetable modules. There is a dire need then to extend the *SSMS* to all primary and secondary schools in the country. The automated functions in SSMS can help to reduce the administrative burden of teachers. One teacher in SMK Sultan Abdul Samad explained,

I've to manually arrange lots of data. I wish my school had adopted the SSMS.

Limited Computer Facilities for Teachers

Almost one half of the respondents specified that only limited computers are allocated for the staff to use. The teachers added that due to this limitation, they find it rather difficult to prepare examination questions and prepare reports. A teacher in Sekolah Menengah Sultan Ahmad Samad lamented,

Every time I want to use the school computer, somebody is using it. I don't get a chance to use.

All the informants contented that there are many desktop and notebook computers in the schools. However, many of the PCs and notebooks are out-of-order.

My school has 19 notebook computers but when a teacher wants to attend a course and needs to bring along a notebook, it is extremely difficult to find one. 12 of the notebook computers are out-of-order. I virtually have to beg to obtain a computer which is in proper working condition.

Computer Courses

Insufficient courses and training

Teachers are currently being given a two week course on ICT integration in teaching and learning. This course which is known as BPPT (Bimbingan Perguruan Profesional dalam Teknologi Maklumat dan Komunikasi) is a nation-wide project held in 90 centres (www.bppt.com.my). Besides the BPPT course, the Local District Education Officials do organize a three day basic computer course for teachers. Though these courses are available, it is difficult to get selected as many teachers want to attend. One SK Sri Langat teacher lamented,

I hope I'd be selected for the 10 days computer course in the near future.

Many have not attended any computer course at all

Two-thirds of the respondents said that a large majority of teachers especially the senior ones have not attended any computer courses at all. The opportunities to attend computer courses are there but however for some rhyme or reason, the senior teachers avoid going by directing other younger teachers to go. They are either afraid or fearful of being ridiculed by fellow teachers of being incompetent. Two comments supported this perception.

> *My fingers are stiff and I don't like to use computers…. Let the young people learn computers. It is of no use to me.*

ICT Skills of Teachers

ICT skills generally poor

Almost two-thirds of the respondents acknowledged that their ICT skills are generally poor. Some of the poignant responses were in this area.

> *I am familiar with MS Word and surfing the internet but when it comes to using Excel, PowerPoint and the scanning machine, I am at a lost. I've to seek help from my friends. Sometimes my friends sulk when I ask them simple ICT questions.*

Request for more training

The bulk of the respondents suggested that appropriate skills training on the use of MS Word, MS Excel and MS PowerPoint be given to all teachers at an on-going basis. Those who have mastered the basic skills should be given opportunities to go for more advanced training. One SK Sri Langat teacher spoke candidly,

> *Please give me training and I can perform. How do you expect me to integrate ICT tools in teaching and learning activities when you don't train me?*

ICT Integrated Lessons

ICT integration rarely carried out

Under the BPPT Project (www.bppt.com.my), as of 31st December 2005, 40,231 teachers in Malaysia have been trained on appropriate ways of integrating ICT tools in teaching and learning activities in the classroom. Out of this total, 3699 teachers are English option teachers and these teachers have been professionally trained by master trainers appointed by the Prestariang Sdn. Bhd., an outsourced private company stationed in Cyberjaya. Approximately two-thirds of the informants specifically indicated that after having gone through the intensive 10 days training on ICT integration, they are aware of the benefits and now know how to integrate ICT tools in teaching and learning activities but unfortunately they are unable to carry out ICT integrated lessons in class. Too many constraints hamper them in this crucial task of ICT integration in teaching and learning activities. The following views exemplify their feelings.

> *I know ICT tools can motivate pupils and help in better understanding of concepts but I can't conduct an ICT integrated lesson because many of the computers in the computer laboratory are not in proper working condition… I have no time and I've to finish my syllabus…I've too many classes to handle and right now I can't think of ICT integration… I've too many administrative tasks to complete.*

Overall only one-tenth (i.e., 10%) of the informants admitted that they did carry out ICT integrated activities three times in a year. This is a big let-down but however at least a few teachers are still keeping the 'torch of ICT integration' burning.

Teachers are generally ignorant of ICT integrated and interactive lessons and quizzes in the web

There are hundreds of websites that have been created to assist in the teaching and learning of English. In fact there are many 'self-exercises' in the internet. English Exercises Online at http://www.smic.be/smic5022/ has over 100 free exercises. They cover vocabulary, grammar and reading comprehension. For an interactive lesson with a real teacher one can visit http://eslgo.com/. At this site a student can learn English as a second language (ESL) with an ESL teacher. In spite of the existence of numerous useful websites, one-third of the informants were ignorant of the existence of interactive and ICT integrated English lessons in the World Wide Web. A teacher from SMK Telok Panglima Garang explained,

> *I didn't know that there are free websites for students to listen to poems and popular stories.*

Supply of Courseware by Technology Division, Ministry of Education (MoE)

Many CD-ROMs have been supplied but rarely used by teachers

Besides the resources available in the Internet, there is a wealth of materials in the form of CD-ROMs available to English teachers. Hundreds of CD-ROMs are sent not only to the Smart schools but to almost all the 10,000 schools in East and West Malaysia. Many of the CD-ROMs have interactive English lessons but somehow only one-third of the respondents acknowledge that they use these resources once a while. Two-thirds of the informants have kept away due to lack of time while five teachers were ignorant of these valuable resources.

> *I don't have enough time to go through the CD-ROMs supplied by the Ministry of Education.*

Obstacles

Laboratory coordinators not skillful in solving simple PC problems

Very often computers in the school laboratories do not function properly. When a computer malfunctions, the problem may be a small one and can normally be put right by a person with elementary computer repair knowledge. Two-thirds of the respondents noted that lack of computer repair and maintenance skills prevent the coordinators from carrying out minor repairs and as a result many of the computers because unusable due to lack of funds for repairs. Allocation of funds for repair takes a long time to be approved. The reason that several teachers do not take their classes to the computer laboratories is that

> *In SK Sri Langat, only 10 out of a total of 25 computers in the lab are usable. Imagine 10 computers being shared by 40 students. The class becomes noisy. I prefer not to take my pupils to the lab.*

Poor support from school administrators

The success of ICT integration in teaching and learning activities to a large extent is dependent on the support given by the school headmaster or principal. Two-thirds of the responses noted negative experiences in relation to support from the Head teacher. One SMK Telok Panglima Garang teacher commented,

> *My headmaster is more concerned about the examination results rather than ICT integration.* Another explained, *My principal all the time talks about better grades in the school assembly. He doesn't repair computers which are out-of-order.*

Negative attitude of teachers

Negative attitude of teachers could act as a stumbling block to greater use of ICT resources in the teaching and learning of English. One fifth of the informants complained that they have inadequate skills and insufficient infrastructure facilities to think about ICT integration. They asserted that it is too difficult for them to integrate ICT tools in teaching and learning activities. The following views exemplify their negative attitudes.

> *Let those who are clever in ICT do the integration…I don't care. I am too old for ICT integration.*

Administrative burden – many tasks are still manual

The administrative burden of teachers has been the bane of teachers in general. In this information era where automated functions are the order of the day, there are still many tasks in schools which are done manually. Preparation of Report Cards, making attendance summaries and filling the Record Book are some of the administrative tasks which wear down the over-worked teacher. Some of the distressing responses were from this area.

> *I feel tired of filling up forms and writing the Record book…The administrative task sometimes eat into my teaching time. I'm bogged down by administrative work… I wish I could spend more time on teaching rather than doing administrative duties.*

DISCUSSION

Almost all the teachers cited lack of ICT resources and infrastructure facilities in schools as the most common reason that impedes the integration of ICT tools in the teaching and learning of English. Computers in fact are available in school for teachers and pupils but the interview findings revealed that many of them are out of order. This is a serious problem and repair facilities are slow. Experience has shown that a notebook owned by the school tend to breakdown faster than one which is owned by an individual. This could probably be due to 'many hands' using a particular notebook and therefore the 'wear and tear' are much greater. It is suggested that it is better for the individual teacher to buy his or her own notebook. The personal possession of a computer may well be the single most important factor enabling a teacher to integrate ICT into their professional practice (Dawes, 2000). It is sad to note that some schools still used Windows 98 Operation System. It is suggested that computers with Windows 98 Operation System should be quickly reinstalled with the latest Windows XP Operating System. However, caution should be exercised by ensuring that only original softwares are purchased and installed. Many urban schools at this point of time have already been equipped with ultra-modern IT facilities. However, computer infrastructure facilities in hundreds of rural schools are still at the bare minimum. Many still do not have proper computer laboratories and those that were built were not done to specifications. According to a Works Ministry Report published in the New Straits Times dated 17th May 2004, out of the 400 computer laboratories which were found to be incomplete or unsafe, only 100 of them have been repaired so far.

Extending broadband facilities is another teething problem that should be urgently looked into as transfer of data and graphics through normal telephone dial-up services are rather slow. School-Net connection has never been smooth and therefore GITN, the service provider for broadband School-Net ought to be improved if we want more teachers to carry out ICT integration. The interviews glaringly revealed the absence of a central database for either the teachers or the pupils. The establishment of a central database is vital in obtaining quick and fast retrieval of data. Having now realized the importance of a central database, the Ministry of Education as of 3rd January 2006 has introduced three different database systems namely SMM for pupils, EMISP for teachers and PREST2K for teacher evaluation (http://www.moe.my). Personal details

of all pupils and teachers in a district are entered into these systems. There has been a lag in the implementation of the Smart School Management System. The SSMS which has been implemented only in the 'Smart Schools' should be extended to cover all the 10,000 primary and secondary schools in the country.

The most revealing finding came from the ICT integrated lessons area. Out of a total of 30 teachers interviewed, only 3 teachers admitted that they have integrated ICT tools in the teaching and learning of English. The others frankly said that they were too many obstacles on their way. One Sri Langat teacher commented, *I have 28 periods and I just don't have the time to plan and implement an ICT integrated lesson.* Another frequent complaint of teachers is the lack of opportunities for training in ICT skills. Training in ICT skills is crucial in implementing ICT integration in the teaching and learning of English. As more teachers become competent in the use of basic ICT tools, there would be more ICT integrated activities in the classroom. This would give a boost to English language teaching and learning. The interviews with English option teachers confirmed the view that the three teachers who integrated ICT tools in the teaching and learning of English have advance ICT skills. 'The extent to which teachers are given time and access to pertinent training to use computers to support learning plays a major role in determining whether or not technology has a positive impact on achievement. Students of teachers with more than ten hours of training significantly outperformed students whose teachers had five or fewer hours of training' (Valdez, 2000). Computer skills training should be provided on an ongoing basis as new software and hardware are introduced. Interim findings from ImpaCT2 indicate that even experienced teachers may find it challenging to integrate ICT into their teaching if they are unfamiliar with software and hardware (ImpaCT2, 2001).

The respondents were vocal in voicing their personal problems and obstacles. These are listed below:

- Lack of support from the school administrators
- Exam pressure and fear of not being able to complete the syllabus.
- Inadequate trolleys to house the LCD in the classrooms
- Long waiting list to use the computer laboratories.
- Over-burdened with administrative tasks
- School servers are not maintained and riddled with all kinds of 'stubborn' virus.
- No supervision on ICT integration by school administrators
- Absence of any kind of school management system in most schools
- Negative attitude of some teachers

The Government is continuously sending more and more teachers for training in ICT skills and providing better infrastructure facilities. Computer laboratory coordinators too have been sent for training in server set-up and networking skills. Interviews with local education officers confirmed these developments. Recent figures released by the Ministry of Education show that 4,500 schools are already equipped with computer laboratories, 99,000 computer units and 4,600 servers. A total of 8,120 schools are connected to the broadband School-Net and a total of 97,000 laptops and 70,000 LCD projectors have been supplied to teachers teaching core subjects (Smart School Bulletin, 2005). The above information augurs well for boosting ICT integration in English language teaching and learning.

CONCLUSION

The informants' responses did provide an insight into the impediments that teachers face pertaining to ICT integration in the teaching and learning of English language. This study has demonstrated that lack of infrastructure facilities is but one of the many causes for poor ICT integration. Several of the informants stated in confidence that even if the infrastructure facilities were to be increased, the situation would not change. What is more alarming is the fact that even after having gone through a 10 day course on ways of integrating ICT tools in the teaching and learning of English, the teachers are not carrying out ICT integration. What is amiss? The interviews suggest that there are far more serious and more complex issues to address. The ICT skills of teachers need to be addressed first. In-house training on ICT skills should be intensified in all schools. Some of the obstacles like the administrative burden need to be seriously addressed. Adequate infrastructure facilities and resources would of course provide a learning climate and environment rich in authentic interaction. Findings have shown that schools which have very good ICT resources achieved better results in English than schools with poor ICT (Becta Report, 2001). However, it is not practical to keep on increasing the number of computer laboratories in the schools. A possible solution would be to fix an LCD and computer with broadband wireless access in a few selected English language classrooms on a permanent basis. In this way, teachers could avoid pushing around the trolleys that house the computer set in and out of the classroom. Presently, the teachers vehemently complain that the trolley wheels are broken and therefore they could not bring the computer set to the classroom.

Another pertinent issue is the indifferent attitude of the teachers. This should be seriously looked into if any integration is to be implemented. Teachers do go for the ICT integration courses and complete it successfully and it appears to end there. Once back in school, the teachers tend to adhere to in their traditional ways of teaching. A sense of commitment and dedication on the part of the teachers is necessary. Close observations by the researchers have mirrored the fact that ICT skills gained at courses are being used to the maximum to further the participants' qualifications but they are not being used to improve their presentation skills for the benefit of pupils. The school administrator, the Education Department and school inspectorate should therefore urge the teachers to integrate ICT tools in the teaching and learning of English as the benefits are many. The successful implementation of ICT integration needs the concerted effort of all the stakeholders. The full cooperation and support from the school administration, positive attitude of English option teachers, continuous training to update teachers' ICT skills and appropriate training on when, when not and how to use ICT tools appropriately in classroom situations is necessary to fully realize the benefits of ICT integration.

REFERENCES

Carmen et al. Use of ICTs and the Perception of E-Learning among University Students: A Differential Perspective according to Gender and Degree Year Group in Interactive Educational Multimedia, No 7 (October 2003) pp 13- 28)

Dawes, L (2000) 'The National Grid for Learning and the professional development of teachers: outcomes of an opportunity for change', De Montfort University: Unpublished PhD Thesis

Fraenkel, J.R, Wallen,N.E.(2000), How to Design and Evaluate Research in Education – Fourth Edition: McGraw-Hill Higher Education

Frayer, D., Creating a New World of Learning Possibilities through Instuctional Technology: Part One**.** AAHE TLTR Information Technology Conference, Colleges of Worcester Consortium, Fitchburg, Massachusetts April, 1997. Available at http://www.sarg.ryerson.ca/~dmason/common/euit.html. Last access date 19/2/2005

Heppell, S (1999) 'Tripping the light fantastic in on-line', Computers in Education, Times Educational Supplement in Leask, M. and Meadows, J. *Teaching and Learning with ICT in the Primary School,* London: Routledge

Laporan Prestasi SPM 2004 , Lembaga Peperiksaan, Kementerian Pendidikan Malaysia

ImpaCT2, 2001 (http://www.becta.org.uk/impact2)

Smart School Bulletin, Volume 1 January 2005. Bulletin produced by Educational Technology Division of the Ministry of Education

Smart School Bulletin, Volume 2, August 2005. Bulletin produced by Educational Technology Division of the Ministry of Education

Software and Information Industry Association (SIIA) Report (http://www.eschoolnews.com)

Sirotnik, K.A.(1989). *Studying the education of educators: Methodology*. Technical Report No 3. University of Washington, Seattle, Washington: Centre for Educational Renewal.

Addresses of other websites referred to in this study

http://www.bppt.com.my - Accessed on 23rd January 2006
http://www.moe.com.my – Accessed on 5th January 2006
http://www.ppk.kpm.my/smartschool - Accessed on 30th December 2005
http://www.becta.org.uk – Accessed on 27th December 2005

International Journal of Education and Development using Information and Communication Technology (IJEDICT), 2006, Vol. 2, Issue 2, pp. 15-26.

The CTC@NSW Program: Achievements and ongoing challenges

Lynne H. De Weaver and Allan Ellis
Southern Cross University, Australia

ABSTRACT

The Australian government funded a variety of Information and Communications Technology (ICT) programs throughout regional Australia through its Networking the Nation (NTN) program. The Community Technology Centre @ New South Wales (CTC@NSW) was one such program. It was jointly funded by the NTN program and the NSW State Government and 55 new CTCs were created between 1 June 2000 and 30 June 2004.

Although the business planning process was an integral part of what communities had to do when they applied for a CTC@NSW grant, community inputs and outcomes regarding this process were not fully evaluated in the CTC@NSW program's Final Report. An independent online survey was subsequently designed and conducted by the first author and revealed that the business plan that was a major component of the application was a key determinant as to the success or failure of the CTCs that responded to this survey.

Keywords: *Australia; Networking the Nation; community technology centre; regional economic development.*

CTC@NSW BACKGROUND

The Australian government funded a variety of ICT programs throughout regional Australia through its Networking the Nation (NTN) program. NTN was funded by the partial sale of Telstra, Australia's own telecommunications carrier. While most of the earlier telecentre type programs funded by NTN focused on providing equity and access to targeted populations, the CTC@NSW program was established to provide seed-funding to create commercially viable community owned and operated businesses in small, regional communities throughout NSW. Each CTC was to deliver a range of community identified ICT based products and services. These services range from Internet access and computer training through to publishing community newspapers, video editing and service delivery for local and state government departments. Products and Services varied considerable from one community to the next – but all reflected community identified needs.

Table 1: *Implementation Stages of the CTC@NSW Program*

Stage	Dates	Activity at Stage	Program Staffing Levels
Stage 1	1June 2000 – 31 January 2001	Planning & Development	3
Stage 2	1 February 2001 – 30 June 2004	Implementation & Roll-out; 9 Funding Rounds	21
Stage 3	1 July 2004 – 30 June 2005	Transition	8
Stage 4	1 July 2005 onwards	CTC Association	1

The CTC@NSW program was implemented in stages. It was originally anticipated that all CTCs should be fully operational and self-sufficient within three years. However, additional stages had to be added to ensure that CTCs funded in later rounds received the support they needed to even be able to open their doors for trading, as many were not able to move into the premises they had identified in their applications until renovations had been completed.

Extensive research into other Australian telecentre programs was undertaken during Stage 1. It was conducted by the CTC@NSW State Manager, the Community Development Manager and a Business Planning Officer.

Implementation and rollout occurred during Stage 2 when the program had a fully staffed Support Unit, with offices in Sydney and Bathurst, along with eleven regionally based coordinators. De Weaver was a Regional Coordinator at this Stage and facilitated the program's rollout in the Northern Rivers region of New South Wales from February 2001 – December 2003.

During Stage 2, the staff of the Support Unit included a Business Strategy Manager, an ICT Officer, a Help Desk Officer and Web Manager, Marketing and Promotion Manager and two Office Administrators. This unit provided ongoing assistance for applicant, as well as funded communities, and identified and helped CTCs to deliver a range of potential revenue streams that might assist the CTCs in building their businesses. The eleven regional coordinators also worked in close collaboration with the Support Unit.

During Stage 3, the program's transition period, the central Support Unit was reduced to four members with just four regional coordinators to provide support and assistance to the CTCs. Stage 3 was established to ensure that communities that had received funding during one of the later funding rounds were not disadvantaged.

The NSW State Government provided additional funding to establish the program's next iteration as the CTC Association. Stage 4 staffing consists of just one paid Business Development Manager

The vision for the CTC Program's during Stage 1 & 2 was, "Bringing communities and information technology together for the benefit of country NSW." (CTC 2004, p.3). Its charter, as shown on its website (20 July, 2004), was "to establish up to 55 new Community Technology Centres (CTCs) in regional NSW communities, with populations of less than 3000 in order to help them gain access to a range of technology services for local businesses, students, community organisations, individuals and identified special groups within these communities."

Applications for grants to establish a CTC involved a two-step process with assistance provided by the Regional Coordinators. Communities first had to complete an Expression of Interest (EOI), which included particulars as to whether or not their community met the program's selection criteria, and then if the EOI proved successful, the Coordinators would work with communities on their Application for Seed Funding. There were three Program funding rounds each year from 2000 – 2003 (Table 1, Stage 2) and during this time six communities in the Northern Rivers received funding approval.

All funding applications required the support of a local auspicing body. These bodies often provided the building/facility in which the CTC was to be located as this was considered to be an essential part of the community's contribution. CTCs applications were evaluated on the basis of the three-year business plan. This Plan was the major component against which the merit of the entire application was assessed. Funding was delivered to the successful communities over three years and covered such things as:

- Computers, software and peripherals
- Office equipment such as photocopiers, colour and black and white printers, scanners and multimedia equipment such as digital cameras or similar, e.g. whatever was decided was required to provide the services needed in their community
- Networking equipment, e.g. routers, etc
- Phone and often fax machines
- Office Furniture including desks, chairs, filing cabinets, tables, etc and
- Administrative Costs: Manager's salary, insurance, accounting fees, consumables, signage, etc.

Mardle states (2003, p.5) "Telecentres are the equivalent of providing people with a motorcar and teaching them how to drive so that they will know how to drive without ever handing over the car so they can drive it where they need or want to go." Although this is a very negative way of looking at telecentre initiatives such as the CTC@NSW program, Mardle's viewpoint is valid because for many small communities even contemplating the use of ICT as a strategy for regional economic development required a significant paradigm shift.

Collits states (2000, p.30) "Communities have finite resources at their disposal for economic development projects and some difficult choices." This was evident in both the CTC's Final Report, and the Online Survey, as those 'finite resources' extended to the skills and commitment of the people in the communities that participated in the CTC@NSW program.

Keller also spoke about the role of Telecommunications in regional development in his chapter in "The Future of Country Towns, (2001, p.29) "Telecommunications will be a major factor in transforming, rather than reforming, the way rural communities do business and live their lives. No amount of digital information can reform the basic distinction between urbanised and the small place give to the massive imbalance of resources… It is assumed that rural areas already showing signs of great vitality will be best positioned to benefit from the new technologies and more remote centres already in decline the least." It is also assumed that people in these communities will have the necessary skills required to ensure rollout and uptake of new ICT products and services as they become available, which unfortunately is not always the case.

The aims of the CTC@NSW program were very much in keeping with the policy of the NSW Government at the time, e.g. 'listening' to what communities wanted to achieve, however as Collits (2001, p. 49) states, "Governments have increasingly turned their attention to the position of small towns, and have implemented programs designed to encourage economic development and to preserve a certain level of services. Governments are increasingly recognising that the task of small town survival is one of both economic development and of community building." Although capacity building was an outcome of the CTC@NSW program it also reflects the economic rationalist policies of both the state and federal governments that funded it.

At the conclusion of Stage 2, the CTC program had clearly achieved its long-term goals that were to:

1. Assist local communities to establish a network of sustainable CTCs across rural and remote NSW;
2. Promote community development and networks of interests in rural and remote NSW;

3. Encourage community demand for Information Technology (IT) services in rural and remote communities;
4. Encourage existing telecentres to join the CTC support network.

By June 2005 there were a total of 88 fully funded CTCs serving over 100 NSW communities with a further five CTCs in the planning stage. This number included the 55 newly funded CTCs, of which six were in the Northern Rivers (Table 1), along with the 33 Telecentres that had been funded by an earlier NTN program.

However, the key to the success of the CTC@NSW was the facilitation role played by the Regional Coordinators as the culture and skill base of these small regional communities proved to be a major variable in achieving successful outcomes.

OVERVIEW OF THE REGIONAL COORDINATOR'S ROLE

The responsibilities and duties of the CTC Regional Coordinators were many and varied with the first task being to create awareness of the CTC@NSW program and generate interest in local communities in their region and to encourage participation in the CTC@NSW program. However, in the Northern Rivers region, less than a third of the twenty-four communities that expressed initial interest in the program actually proceeded with an application, for many communities, the time; effort and commitment required to proceed with the application process were just too daunting.

Regional Coordinators organised community meetings to explain the program, established local steering committees and conducted ongoing community consultation to ensure that key stakeholders became engaged in the planning process. Their key responsibility was to assist communities with their applications and help them to prepare a comprehensive, three-year business plan. They also liaised on an ongoing basis with the program's support unit and assisted them in the preparation of ministerial briefings and finally, they helped to manage community expectation regarding the outcome of their application.

This consultation period usually lasted from four to six months, but in two Northern Rivers communities, the application process lasted over a year, due to changes in the membership of the CTC organising committees in these communities.

The EOI and the application were facilitated by the Regional Coordinator using a structured consultative process that involved various stakeholder groups. Representatives from these groups went on to become members of the CTC Planning Committee and the skills they provided, varied significantly from community to community. The Regional Coordinators worked closely with these committees to complete the CTC@NSW Applications for Seed Funding and helped them to determine how much they could apply for *after* they had completed a rigorous business planning process. Communities could apply for amounts ranging from $50,000 to $200,000 with the final amount being determined by the services that they planned to deliver at their CTC in order to meet their Key Performance Indicators (KPIs) as shown in their individual business plans.

FINDINGS FROM THE FINAL REPORT

Although, the three year business plan that each community had to prepare was the key factor in evaluating a community's application, the business planning process, and the skills required, were not covered in the final report nor were some of the technical issues that left communities frustrated and unable to deliver key components of their business plans.

Clearly this paper cannot address all the key performance indicators of the CTC@NSW program, but the Executive Summary in The CTC Program's Final Report highlight the key issues (p.3), "Lack of available time from community members and other local issues, such as drought, often hindered progress with the Application for Seed Funding and the development and establishment of Centres." Many of the successful applicant communities also needed more time to establish their CTCs than had initially been anticipated. It went on to state, (p.4) "The business concept of sustainability within three years of opening was an optimistic expectation of the Program, which in most cases has fallen short because of the inability of Centres to generate income at a local level." It went on to say that, "…Centres still in development are at risk if they do not receive the support offered to other centres during start-up. To meet this need, the NSW Government extended the tenure of staff (Figure 1, Stage 3) to assist with business brokerage, business and community development, maintenance of the www.ctc.nsw.gov.au website and technical support."

The reference to the technology issues that affected a CTC's performance, stated (Final Report, p.27) "The cost of maintaining the basic technology infrastructure continues to be an issue for CTCs…Bandwidth for communities continues to be a key issue…There is an expectation that access to broadband infrastructure will be readily available to carry volume data at affordable prices in the near future…Access to appropriated and affordable training continues to be an issues particularly in the more remote communities."

THE ONLINE SURVEY

While the Final Report was written to address the funding provisions of the CTC@NSW program as determined by both the NSW and Federal government, the online survey which was conducted in May 2005, was from a Coordinator/Community focus and designed to gain insight into this type of telecentre program from the perspective of participating communities.

Permission was requested from the Program Manager to conduct an online survey of the funded communities prior to June 2005 when funding for the CTC@NSW program finally ceased. An email was sent to all 55 of the newly funded CTCs requesting that the CTC Manager participate in the survey by clicking on the hyperlink. The first request for participation was emailed to the Managers on 27 March 2005 with a reminder email advising that there was still time to complete their survey sent on 27 May 2005. There was an 85% response rate from participating CTCs.

The survey was structured into three major sections and consisted of 29 questions. The first section, questions 1 – 5, incorporated basic information as to the location, size and management structure of individual CTCs. The second section, questions 6 –18, looked at the 'whys and wherefores 'of the application process from the communities perspective, while the third section, questions 19 – 29, focused on the business outcomes of the individual centres and provided general commentary as to whether community expectations had been met.

HIGHLIGHTS FROM THE SURVEY

For many of the communities involved in the program, it would have been very difficult to undertake the application process without the assistance of their Regional Coordinator and the help provided by the Support Unit. Figure 1 clearly illustrates the complexity of the application process by the time required to complete it.

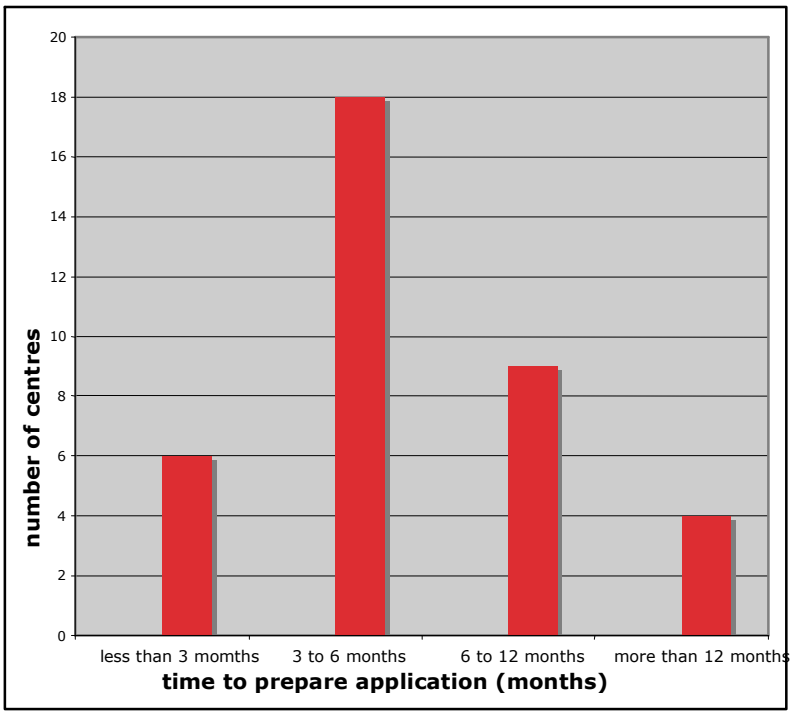

Figure 1: *Responses to Q6 (n=41) showing the time taken to complete a CTC Application for Seed Funding.*

In response to question seven, "Do you think that the people on your application Committee could have completed the CTC Application with out the help of the CTC Coordinator in your region?" Only six of the responding communities said 'yes' while all the others said 'No'. This reflects Hearn's findings (2004, p.15) "…learning strategies for rural and regional communities need to be planned and that communities need to be helped to help themselves. The 'strengths and resources of the community' should be identified and used effectively 'to advance the community'. In fact, he found that the level of skills and business acumen on the organising committee where a major determinant in the success of a communities' application.

Thirteen of the respondents were auspiced by the local council, five by local training organisations and two by Business Enterprise Centres with the balance being sponsored by a variety of organizations such as Neighbourhood Centres, Tourism Information Centres and a Community Museum.

However, in response to the question ten, "Does this Auspicing organisation still provide any ongoing support?" 36 CTCs said, "Yes' while only eight said "No". Of those who said "Yes" 28 were on the CTC Management Committee in addition to being members of the Auspicing

organization. This level of ongoing commitment to the CTC program proved to be an indicator of success or failure of the responding CTC.

Eleven of the Auspicing organizations provided ongoing financial assistance, 26 provided the premises for the CTC while six either generated work for the CTC, lent equipment, provided maintenance, helped to run the centre, filled staffing gaps or provided administrative support. Anecdotal evidence also revealed that the Auspicing aspect of the program caused considerable angst to the committees in several of communities that she assisted. This was especially true in one community that had undergone a recent local council amalgamation as the CTC was seen as a means of retaining its previous identify as a council in its own right rather than as a junior partner in a much larger council.

However, although successful applicant communities had submitted comprehensive business plans, the survey revealed (Figure 2) in response to the question 19, "Have you implemented, all or part of the original business plan (the one prepared as part of your CTC application)…" few had.

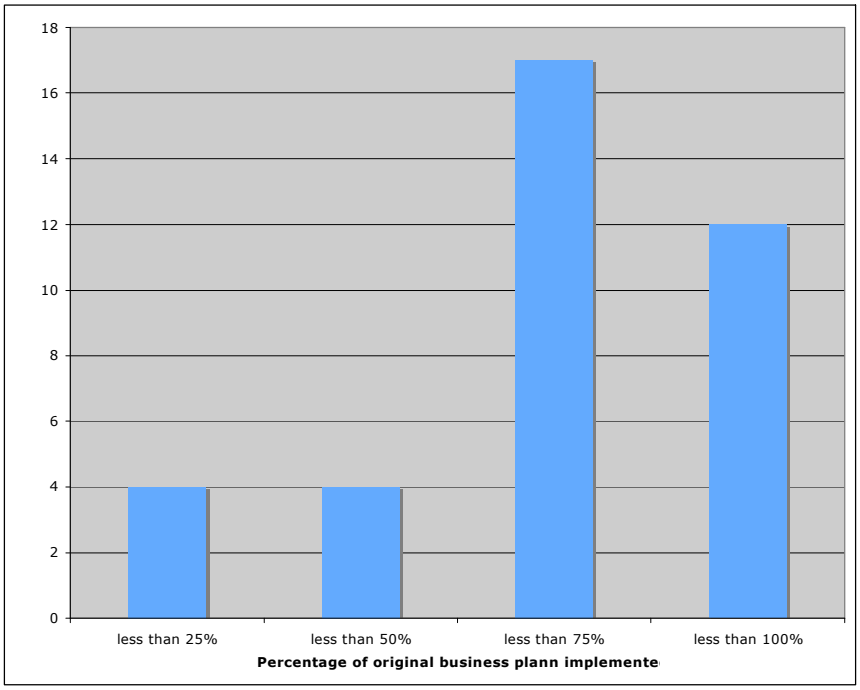

Figure 2: *Responses to Q19 (n=37) percentage of original business plan implemented when survey was taken.*

The following summary statistics are indicative of some of the other issues that emerged when the survey data was analysed:

- Eight of the CTCs surveyed indicated that they had achieved the results they had hoped for in their first year of operation, thirty-six said they hadn't
- Sixteen of the survey respondents indicated that they had had long standing technical problems

- Thirty-four indicated that they felt that CTC Managers should receive ongoing ICT training in order to provide a higher level of technical service and support for their CTC customers
- Thirty-eight of the respondents said that they had a manager, twenty-one were run by volunteers, nine were run in conjunction with other services offered by the Auspicing body and five indicated other solutions (All CTCs were supposed to have a paid full-time manager to help them 'run the business')
- Thirty-four of the CTCs had between one and three volunteers, ten had between four and eight volunteers and none had more than eight. The number of volunteers available was also a factor in the number and type of programs that individual centres were able to run

In response to question seventeen, 'If you are the CTC Manager, does your CTC Management Committee provide you with clear direction for managing your CTC?' 18% said 'Yes', while 82% said 'No'. Of those Managers who said 'No', the main issues that affect them were:

- Management Committee didn't meet on a regular basis
- Management committee didn't have enough business experience
- Key stakeholders in the community were not represented
- They didn't follow the business plan
- They weren't interested in working with the CTC@NSW support team

Some comments from individual CTC Managers regarding their Management Committees:

- Original committee did not seem as interested in the day-to-day running of the centre
- They're too busy with their own businesses to give priority to voluntary work
- They are not as interested in the direction of the CTC as they were 12 months ago
- Although we try to meet on a regular basis (once a month) sometimes we just can't get together
- Members of the Management Committee have no real business experience
- The previous manager had no clear directives or help

Figure 3 shows the responses to the question twenty-one, “Has your CTC achieved its budget in its second year of operation?”

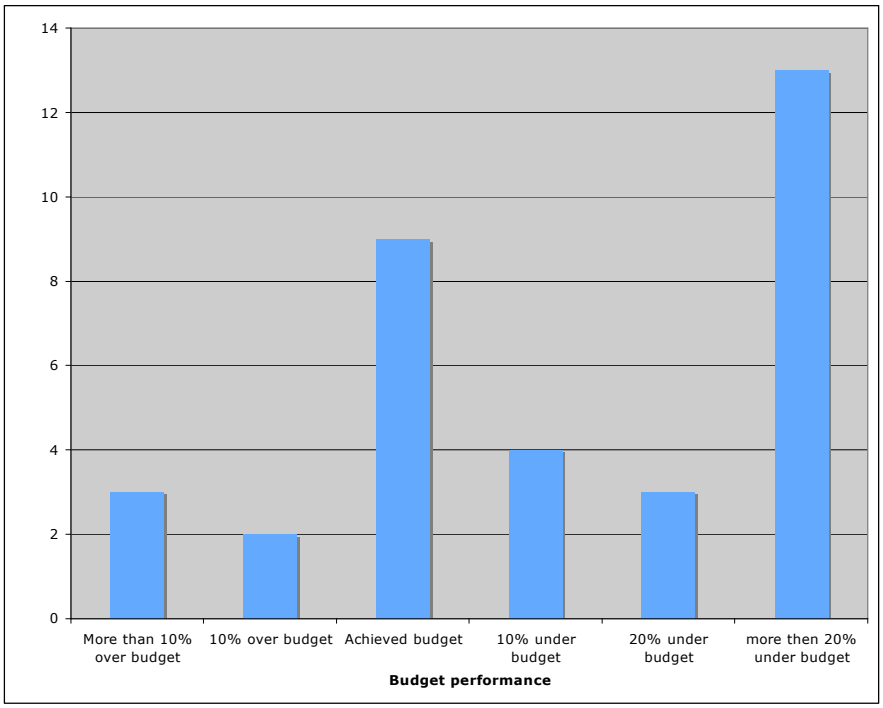

Figure 3: *Responses to Q21 (n=34) Budget performance in second year.*

A number of factors were attributed to this improvement and respondents usually ticked more than one:

- Sixteen indicated that they had revised their business plan
- Twenty-four indicated that they had done more to advertise and promote the products and services offered
- Nine conducted surveys to get more input from the community
- Eighteen added additional services in response to requests from the community.
- Eleven indicated that they had established additional partnerships with other regional stakeholders
- Twelve provided more training programs
- Sixteen indicated that the CTC@NSW support unit had provided them with more opportunities to participate in new programs and activities that were designed to generate revenue.

Figure 4 clearly shows how communities felt about the level of support they had received from the Support Unit.

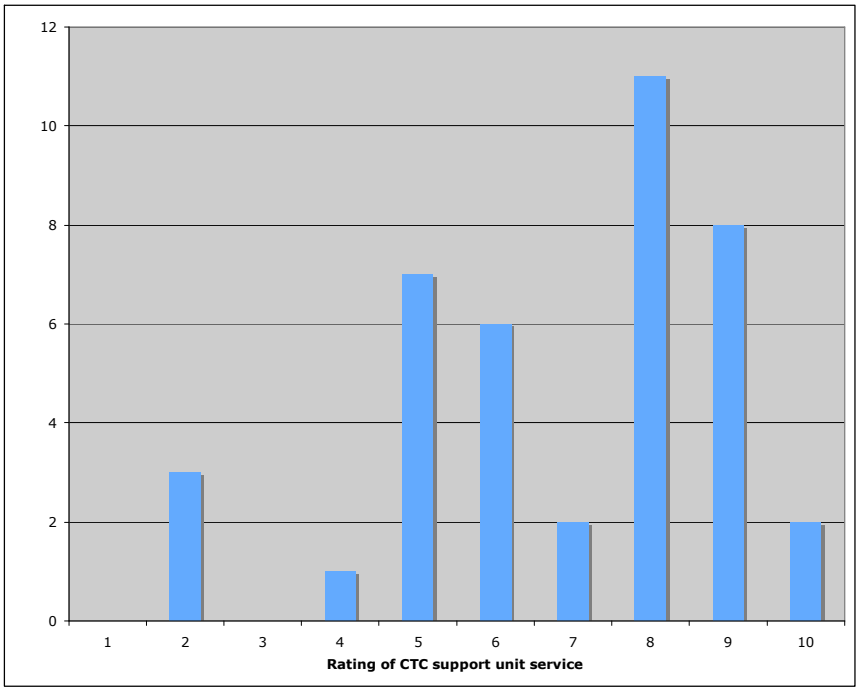

Figure 4: *Responses to Q24 (n=40), rating of the CTC Support Unit on a scale of one – ten, with one equalling poor and ten equalling outstanding.*

In response to the question twenty-five, most of the respondents indicated that they felt that their CTC had promoted and provided increased access to Information and Communications technology in their community with forty-two saying, "Yes". Sixty-four percent (64%) of those who responded to this online survey provided positive comments to question twenty-seven which asked*: 'Do you think your CTC has had a positive impact on the economic development of your community? If, yes please comment*.' Of those responding to this question:

- 30% indicated that they felt that the program's goal to 'Promote community development and networks of interests in rural and remote NSW had been achieved in their community,
- 40% indicated that the goal to 'Promote community demand for IT services in rural and remote communities had been achieved,
- 30% indicated that both of these goals had been achieved in their communities.

The following quote perhaps best encapsulates the overall tone of the responses to this question.

> *"People hiring entertainment gear from in town instead of the larger centres, this saves local people petrol money and travel time. Young people spending money at the centres gaming days instead of going to the larger centres looking for entertainment. Families and older couples as well as the youth are able to go to the movies that we offer for a fraction of the cost of travelling to the movies out of town and paying their much higher costs. People can get advice on new technology locally before making bad purchase choices. Photos with*

Santa are a fraction of the cost of having them done out of town meaning that poorer families can afford to have it done without having to fork out for the trip to the larger centres and then paying premium prices on the photos as well."

Only 13% of the respondents to this survey included a negative comment to the above question. Most of these comments were about issues that were specific to their community and did not really address the overall goals of the CTC@NSW program.

And finally, in response to question twenty-nine, "Do you think the Manager of your CTC should receive ongoing IT and technical training in order to provide a higher level of technical services and support for customers of your CTC?" 34 respondents said 'Yes' while only 9 said 'No'.

CONCLUSIONS

The ongoing role of the Federal Government in using ICTs as a tool for regional development is evident in its discussion paper that presents its 'Clever Networks' Broadband Strategy (2005, p.16),

"The first two aims of Clever Networks are to:

1. *Increase assess to, and effective use of competitive broadband networks in regional, rural and remote communities.*
2. *Focus on the delivery of government services such as, but not limited to, health, education and emergency services…"*

Policy objectives for Clever Networks (2005, p.16) indicate that Governments should, "…assist communities to develop skills and capabilities to realise the social and economic benefits broadband can provide…"

While many of the comments provided by survey participants supported the findings in the CTC@NSW Final Report, they also provided insight into how the communities themselves felt about their participation in this program. The survey also highlighted the importance of having a robust support unit and regional coordinators as provided during Stage 2 (Figure 1) to ensure more successful outcomes.

While the CTC program has entered a new phase of its operation, as the CTC@NSW Association, comments made by the surveyed communities indicate that there are still many people in the communities that established a CTC that access to ICT products and services plays an important role in regional economic development and that governments should continue to help communities build capacity by supporting such programs. However, in order for programs such as the CTC@NSW to enjoy ongoing success they must continue to have access to the support and commitment of all three tiers of governments – local government to assist with accommodation, the State Government to provide personnel to deliver the range of support and services required to make these small community owned businesses viable on a long-term basis and, finally, the federal government to provide a secure source of ongoing funding to support programs such as the CTC@NSW program.

CTCs can and should continue to play an important role in regional economic development but they can't do it on their own. Governments need to leverage the investment they have already made in programs such as the CTC@NSW if they are to pay more than just 'lip service' to the goal of regional economic development as positioned in Clever Networks. In addition, governments should continue to establish and support programs such as the CTC@NSW program in delivering the range of services that individual communities have identified in their business plans. CTCs should have the capacity to evolve into robust broadband delivery points for local, State and Australian government services. Australians living in rural and remote and

rural regions must be able to access the same range of services as those offered to people living in capital cities. Although communities that established CTCs will continue to face challenges, there must be greater long term funding commitment from governments – at every level - to ensure long-term success for programs such as the CTC@NSW.

REFERENCES

Broadband Connect and Clever Networks: Supporting Investment in Sustainable Broadband Infrastructure, (2005). Discussion Paper, November, Department of Communications, IT and the Arts, Canberra.

Collits, P. (2000). *Small Town Decline and Survival: Trends, Success Factors and Policy Issues,* First National Conference on the Future of Australian Country Towns.

Collits, P. (2001). "Small Town Decline and Survival: Trends, Causes and Policy Issues", Chapter 2 in Rogers & Collins (2001), pp. 32 – 56.

CTC Final Report, June 2004, released by NSW Department of Commerce & Office of Information Technology, Sydney.

Hearn, G., Kimber, M., Lennie, J., (2004). *ICTS and Regional Sustainability: A Critique and a Way Forward*, CIRN Conference and Colloquium, October, Prato, Italy.

Keller, J.W. (2001). "The importance of Rural Development in the 21st Century", Chapter 1 in Rogers & Collins (2001), pp 14 – 3.

Mardle, E. (2003), *Telecentres: How Did We Lose the Plot?,* Downloaded from the ICT for Development Gateway, January 2006.

Plowman, I. Ashkansay, N.M., Gardner, J., Letts, M. (2003) Main Report, *Innovation in rural Queensland: Why some towns thrive while others languish*, University of Queensland, Brisbane.

Rogers, M.F. & Collins, Y.M.J. (2001), *The Future of Australia's Country Towns,* Australian Print Group, Centre for Sustainable Regional Communities.

International Journal of Education and Development using Information and Communication Technology (IJEDICT), 2006, Vol. 2, Issue 2, pp. 27-34.

Releasing the pedagogical power of information and communication technology for learners: A case study

Cecily Knight, Bruce Allen Knight and Daniel Teghe
Central Queensland University, Australia

ABSTRACT

There is currently much debate around how best to incorporate Information and Communication Technologies (ICTs) into teacher education programs (Karsenti, 2001; Snider, 2002; Bain, 2004). Rapid advances in ICTs demand changes to our education systems. Computer technology has been absorbed into our schools but in many instances teachers simply deliver old lessons in a new format, and rarely fully capitalise on this technology in their practice. This article explores two issues, firstly, what are the barriers to educators embracing the new technologies, and secondly, what role do teacher education programs play in breaking down the barriers. In discussing these issues, initiatives being undertaken in Queensland are highlighted.

INTRODUCTION

Western societies are currently experiencing a transition from the industrial economy to the knowledge economy (Hargreaves, 2000), with obvious implications for education systems. Miller (2003, p.2) suggests that changes in the socio-economic landscape raises questions about the role of schools in the 21st century, and asks:

> *Under what conditions could today's schools play the same roles as in the past? Can the schools evolve along with the changing socio-economic context, and if so, how? Further, will the school serve as a brake or accelerator of desired changes?*

International research into the attitudes and skills of educators indicates that they have difficulties in embracing the rapid changes they are faced with (Albee, 2003; Bain, 2004; Christensen, 2002; Iding, Crosby, & Speitel, 2002; Plotnick, 2004; Rovai & Childress, 2003; Simpson, Payne, Munro & Hughes, 1999; Tsitouridou & Vryzas, 2003). While most educators appear to acknowledge the importance and relevance of Information and Communication Technologies within teaching, difficulties nevertheless continue to be experienced within the processes of adopting these technologies. Significantly, there is a gap between the valuing and relevance of 'new skills' and the extent to which they are practised in schools. For example, Simpson *et al* (1999, p.248) report that:

> *It appears that in tutors' delivery of the courses, the students seldom experienced demonstrations of the use of ICT as a teaching tool –i.e. the tutors seldom modelled its use through their own practices. The high level of importance and priority that tutors attach to ICT as an educational tool might be expected to be reflected in the extent to which they do not merely encourage, but also require its use by students.*

On anecdotal evidence, these difficulties appear to be similar to those currently experienced by Australian educators. We agree with Miller (2003) and suggest that, in relation to ICT, our schools have been operating as a brake more often than an accelerator**.**
As teacher educators, we need to take some responsibility for this and seek ways to address the issues. In the event, there is a need therefore to better prepare teachers to use the technology as a significant tool within teaching practices.

THE KNOWLEDGE ECONOMY

Gaining an understanding of our past helps us to understand the present and consider what is possible for the future. It is clear that society in the 21st century is different to that of the 20th century. The education systems of the welfare states, which prepared students for an industrial society, have given way to the new economy and globalisation (Hargreaves, 2000; Knight, 2000, 2002).

The industrial revolution has had a profound effect on education systems. Education systems were planned attempts to prepare people for a world of work increasingly dominated by manufacturing. The old economy demanded a vocational training mentality. We can observe many practices in our schools that are closely aligned to those used to regiment industry. For example, whistles in factories and bells in schools; clocking on and off at a regular time in the factory and 9-3 in schools; pay grades in factories and grades on report cards in schools; promotion through pleasing a boss and success through pleasing a teacher and meeting the requirements of standardised tests. All of these were designed to achieve 'normalisation' through uniformity, conformity and a mass production mentality. The result is standardised groups of children, and schools and education systems that are inherently conservative institutions.

However, research (eg Bentley, 2002; Hargreaves, 2000) reports that the knowledge/information economy demands an education system that responds to its requirements for a more flexible and adaptive workforce, as well as striving towards promoting socially just society. The arrival of the post-industrial society has brought a realisation that the new economy will be increasingly focused on the trade in knowledge through the medium of communication technology, which brings the educational systems into the debate about how to best adapt to an information society to provide the best educational opportunities for young people (White and Wyn, 2004, pp.122-4). Recent shifts in Queensland state education policy indicate recognition of the necessity for understanding this. Thus, *Queensland State Education-2010*, (2000, p.6) – the state government document outlining the vision for Queensland schools – observes that, "Information technology is the technical construct of the knowledge economy", which has enormous implications in respect to the challenges faced by education systems as they respond to the changing needs.

The relevant concern, then, is how well teacher educators perceive and address the challenges for education. Hargreaves (2000, p.2) suggests there are three fundamental building blocks to resource the knowledge economy, requiring three interdependent capacities: "the capacity to be creative; the capacity to turn a creative idea into an innovation; and the capacity to market innovations successfully". This also gives some indication as to the kinds of expertise, pedagogy and curricula which teachers need to access within educational systems in order to be enabled to effectively contribute to, and participate in, a knowledge-based society. Hargreaves (2000) suggests that an overall strategy of knowledge management can facilitate this, and is critically tied to the future success of education systems in the OECD countries. The challenge is to ensure the building blocks are utilised to harness the full potential of the explosion of the growth in information and communication technologies.

IMPLICATIONS FOR EDUCATORS

How then can education systems mirror these changes and help prepare students for life in a knowledge economy? We propose that the answer has two parts: the first assesses the notion of professional knowledge, while the second promotes a new way of operationalising ICT's within educational contexts.

New Professional Knowledge

There is a need for new professional knowledge for teachers: education systems need to draw on the collective intellectual capital of educators. This stands in contrast to the old model of teacher education, which involves university–based researchers disseminating information to teachers within the context of formal teacher education programs. Rather, we argue that the old system needs to be replaced by approaches that facilitate and nurture flexible learning communities, which requires a change in both the knowledge and behaviours of teachers.

Within this approach, teachers become involved in the creation of professional knowledge that is relevant and context-specific. The Bachelor of Learning Management provides an example of this approach – a relatively new and innovative undergraduate education degree developed by Professor Richard Smith and delivered at Central Queensland University, Australia. Within this program, the notion of the teacher as expert is replaced by that of the teacher as the manager of learning – their own learning and the learning of the students they work with. The learning community of this teacher education program includes the university, schools and other learning sites, and the wider community in partnership. A mindset is established that values the input of a variety of learners and ways to learn. Consideration is given to where 'education' ranks in the list of powerful influences in the teachers' as well as in students' lives. Multiple images of learning are acknowledged and the challenges for 'teachers' or 'learning managers' associated with these images of learning are considered and critically evaluated.

To illuminate this approach from a conceptual perspective, we refer briefly to two different kinds of knowledge creation, which have been labelled as 'Mode 1' and 'Mode 2' types of knowledge (Gibbons, Limoges, Nowotny, Schwartzman, Scott and Trow, 1994). Mode 1 knowledge is more academically created, usually in universities and is generally individually created. Mode 2 knowledge is interdisciplinary and team generated. The latter type of knowledge, rather than being created by researchers in a university and applied in the real world, is circuitous in that it evolves from its application in solving problems in the real world.

The knowledge that is required by students in the knowledge economy and by students in teacher education programs in relation to information and communication technologies is Mode 2 knowledge. However, an additional factor in this is that in the interdisciplinary- and team-generated knowledge is that much of the technical expertise often rests with the younger generation. For example, as Tapscott (1998, p.2) has found that,

> *For the first time in history, children are more comfortable, knowledgeable, and literate than their parents about an innovation central to society…There is no issue more important to parents, teachers, policymakers, marketers, business leaders, and social activists than understanding what this younger generation intends to do with its digital expertise.*

We should also be aware that although the Information Age has existed for about 30 years, a significant part of our information still moves in paper form. In many instances we are still not fully realising the potential that the technology offers, and that the tools and connectivity of the digital age offers exciting ways to obtain, share and act on information (Tapscott, 1998; Teghe, Knight, and Knight, 2004).

Therefore, in the context of seeking a new professional knowledge, a thorough understanding of the communication media alternatives is essential for the professional communicator. However, every communication medium has its strengths and weaknesses. What is important is the ability to choose the appropriate medium for each communication event. It is also important to acknowledge that there will be great variation among pre-service teachers regarding knowledge of and competence with, information technology. It cannot be taken for granted that all pre-service teachers will enter a teacher education program with computer literacy, but it should be

expected that the program will provide them with the skills and knowledge to use ICT as an empowering tool for learners.

Another aspect of the learning management approach is its focus on the active role of reflection on the impact of ICT on the society as a whole, and thus on the future of young people. Participants in the Bachelor of Learning Management, including teachers and students, examine the nature of change that ICTs bring in society and implications for the children of the future, and seek practical ways in which learners and learning managers can embrace the technology. The importance of such change and its impact on educational contexts is being increasingly underlined in the literature, with an emphasis on catering for such change within educational systems. For example, Tapscott (1998, p3) observes that,

> *The digital media is increasingly a reflection of our world – every view, every discipline, every commercial interest, every repository of knowledge. Because it is distrusted, interactive, malleable, and lacking central control, it is a vehicle for revolutionary change in every discipline, attitude and social structure. Never has there been a time of greater promise or peril. The challenge of achieving that promise, and in so doing save our fragile planet, will rest with the Net Generation. Our responsibilities are to them - to give them the tools and opportunities to fulfill their destinies.*

Writers such as Tapscott (1998), Veen (2002) and Teghe and Knight (2004) bring to our attention the tremendous intergenerational differences existing between the established educational systems and those that are required by, and will make sense to, what Tapscott (1998) calls the "Net-generation" (born 1977-present) and Veen (2002) calls "homo zappiens" (presently the 3-16 years olds). The professional educators of the future would benefit from a reflexive approach to their practice as it stands in the context of change that is brought about by generational interaction with technology, and the meaning and purpose it is imbued with by users within their own historical contexts. As an example, Tapscott (1998) discusses the role of television in shaping the baby boom generation and their world (those born between 1946 and 1964). By contrast, the next generation, which is referred to as the baby bust generation (born 1965-1976) because 15% fewer babies were born, are "aggressive communicators who are extremely media-centered", while the last generation (born 1977-present) is known as the "Net-generation" for the way that they have embraced the Internet as a primary means for communication and access to information (Tapscott, 1998).

As learners, young people are increasingly taking responsibility for and are increasingly in charge of information flows, creating virtual communities as a means of imbuing their learning experiences with meaning (Teghe and Knight, 2004). Learning for the younger generation '…is enhanced by confrontation with complex interactive experiences, [and is] a non-linear process of adaptation using associative and creative thinking' (Veen, 2002: online).

In light of this, education professionals need to reflect on how young people – what Tapscott (1998) calls the N-Gen – might not see the technology as technology. They see, instead, the people, friends, and information at the other end rather than the computer screen. As an analogy, parents do not talk about pencils – they talk, instead, about writing. It is like assimilation for the N-Gen and accommodation for adults who haven't grown up with computers as part of their environment. Thus, there are implications for educators in the communication aspects of the culture. Tapscott's (1998) research shows that N-Gens are dissatisfied with the broadcast paradigm TV offers and favour a model of increased interactivity. N-Gens are a generation of critical thinkers because they have the tools to question and challenge, debate, and so on. We assert that educational providers who are trying to transform themselves for relevance should heed this type of research.

Leadership has an important role in formulating educational programs that promote new professional knowledge, although it is also important to understand the kind of leadership that is required. Miller (2003) discusses two types of leadership: strategic leadership and everyday leadership. He describes strategic leadership as being about setting goals and everyday leadership as being about the choices that make the vision a reality. Society has some brilliant strategic leaders, but there is also a need for practical measure that will translate the ideas into reality – which requires everyday leadership. For example, one of the ways in which strategic and practical leadership can link to facilitate a more effective understanding of ICTs by educators is by engaging the N-Generation in planning teacher education programs. As it is, many 'experts' are consulted when designing such programs for relevance, while generally overlooking the possibility of formulating a key partnership with young people.

New ways of operationalising ICTs

There is no doubt that ICTs are seen as central to education in the 21st century. The Queensland Government has made a huge commitment to promoting the use of new communication technologies through its *ICTs for Learning* initiatives. These initiatives are part of the Queensland Government's (2002) policy, *Education & Training Reforms for the Future*. A commitment to fund the area of ICTs with a large monetary support package indicates a commitment to delivering the education and hardware needed to service the needs of the information economy. This policy has practical effects, reflected in the example of the new Queensland Technology Syllabus for Years 1-10. This syllabus uses a learner-centered framework where "through the experiences and challenges of 'working technologically', students develop a range of associated knowledge, practices and dispositions" (Queensland Schools Curriculum Council, 2002, p.2). Thus ICTs are seen in government policy to very much be just one of the tools for learning.

Education reform in Queensland is reflected in teacher education programs. It is reported, however, that teachers often feel that they are not provided with adequate support to use technology effectively in the classroom (Brush, Glazewski, Rutnowski and Berg, 2003). This is an example of how policy attempts to address change, but in practical terms educational systems undergoing transformation fail to deal with significant factors that influence how transitions take place.

In light of this, the Bachelor of Learning Management (BLM) degree has seen a radical redesigning of the model of teacher education. Policymakers and stakeholders have worked together to design a program that focuses on collaborative learning and exploring ways to manage learning throughout the lifespan. The design is multi-disciplinary and multi-sectoral. Rather than the focal point being 'knowledge' or 'information' as the important components, the focus is on the ability to access information, create solutions, analyse and apply knowledge. New partnerships have been established between the university and schools/learning sites. Practising classroom teachers also work as teacher educators and mentor student teachers. University-based teacher educators network with schools in a variety of ways. Universities, schools and community partners together facilitate learning in this teacher education model.

An example of how this is done is in the way information literacy is explored. One of the first courses of the BLM, 'Networks and Partnerships', teaches some of the skills needed to access information literacy. Subsequent courses in the program have information literacy skills embedded in the courses, such as when students are required to use various databases, websites and other e-resources. In this way, as the 'information' changes, students will have the skills to access, analyse and apply 'knowledge' that is relevant to the situation. Computer literacy is managed in the same way. The ability and skills (basic competencies) required to negotiate the hardware are taught but students are encouraged to see the potential of the 'tool' and the autonomy it gives learners rather than be focused on specific 'computer knowledge' as the final

point. The ability to learn new skills and adapt to new hardware and software will be essential as in the knowledge economy, technology and pedagogy are quickly outdated. After the initial 'skilling', computer literacy is also embedded in subsequent courses.

A crucial aspect of this model is that it incorporates a 'futures perspective'. It is a model that is amenable to the notion of continuous change and reform. Change is accepted as the constant rather than the variable. Learners (whether teachers or students) are prepared for the present and for the future. Learning is dynamic, flexible and responsive to the needs of particular contexts. ICTs are simply one of the change agents as tools for learning.

The BLM with its emphasis on a futures orientation has the potential to be a successful model of teacher education for the 21st century. Students position themselves to enact change, collaborate successfully with students and other stakeholders and release the power of ICTs for learners.

CONCLUSION

For students facing the challenges of the twenty-first century, there is a need to replace current traditional models of education with a model that reflects the knowledge economy and the need for lifelong learning. Our teachers are experiencing reform fatigue with all of the major developments that have occurred in the last decade. Educators need to recognize the need to constantly update skills and knowledge, not only of their students but their own skills as well. In the knowledge economy, there is a new role for teachers. While teachers have the 'reform' mindset (the brake), they are not seeing themselves as lifelong learners (the accelerator) who are constantly updating their knowledge, skills and pedagogy. Governments are spending large amounts of money on technology and infrastructure so that powerful ICTs are available for use in schools. These ICTs have the potential to significantly influence teaching practice, students' learning and engagement in the learning process.

REFERENCES

Albee, J. (2003). A study of preservice elementary teachers' technology skills preparedness and examples of how it can be increased. Journal of Technology and Teacher Education. 11(1): 53-71.

Bain, A. (2004). Secondary school reform and technology planning: Lessons learned from a ten year school reform initiative. Australasian Journal of Educational Technology. 20 (2):149-170.

Bentley, T. (2002). *Fast track to where?* Paper presented at the Fast track Teachers Conference. 24 July, 2002. Retrieved September 5, 2002, from http://www.demos.co.uk/A_speeches.htm

Brush, T., Glazewski, K., Rutowski, K., and Berg, K. (2003). Integrating technology in a field-based teacher training program. *Educational Technology, Research and Development.* Vol 51 (1):On-line

Christensen, R. (2002). Effects of technology integration education on the attitudes of teachers and students. Journal of Research on Technology in Education. 34(4): 411-433.

Education Queensland. (2000) *Queensland State Education – 2010.* State of Queensland (Department of Education).

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., & Trow, M. (1994) *The New Production of Knowledge*. London. Sage.

Hargreaves, D. (2000) *Knowledge Management in the Learning Society*. Paper presented at the Forum of OECD Education Ministers, Copenhagen.

Iding, M., Crosby, M., and Speitel, T. (2002). Teachers and technology: Beliefs and practices. International Journal of Instructional Media. 29(2): 153-170.

Karsenti, T. (2001) From blackboard to mouse pad: training teachers for the new millennium. *Education Canada.* Vol 41(2), pp32-35.

Knight, B. A. (2000). Keynote Address. New Basics and Productive Pedagogies: A Viewpoint on implementation. *Building Professional Learning Communities Conference*, Mackay, January.

Knight, B.A. (Ed) (2002). Reconceptualising learning in the knowledge society. Flaxton:PostPressed.

Miller, R. (2003) *Schools and the Future*. Paper presented at the OECD Forum on Schooling for Tomorrow. Poitiers: France.

Plotnick, E. (2004). Changing teacher perceptions and use of technology in the classroom. Educational Technology, Research and Development. Vol 52 (1):On-line

Queensland Schools Curriculum Council (2002) *Years 1-10 Technology Syllabus.* Brisbane. The State of Queensland (The Office of the Queensland School Curriculum Council)

Rovai, A. and Childress, M. (2003). Explaining and predicting resistance to computer anxiety reduction among teacher education students. Journal of Research on Technology in Education. 35(2): 226-235.

Simpson, M., Payne, F., Munro, R & Hughes, S. (1999) Using information and communications: Technology as a pedagogical tool: Who educates the educators? *Journal of Education for Teaching.* Vol 25 (3), pp247-262.

Snider, S. (2002) Exploring technology integration in a field-based teacher education program: Implementation efforts and findings. *Journal of Research on Technology in Education.* Vol 34(3), pp230-249.

Tapscott, D. (1998) Growing Up Digital: The Rise of the Net Generation. McGraw-**Hill:** New York.

Teghe, D. and Knight, B. (2004). Productivist Education vs. Contextual Learning: Evaluation and the place of 'flexibility' in discourses of online education systems. *Turkish Online Journal of Distance Education-TOJDE*. 5(3), Retrieved from the World Wide Web: http://tojde.anadolu.edu.tr

Teghe, D., Knight, B. and Knight, C. (2004). The SWIMS CD-ROM Pilot: Using Community Development Principles and Technologies of the Information Society to Address Identified Informational Needs. *Journal of Issues in Informing Science and Information Technology.* 1(1), 497-508.

Tsitouridou, M. and Vryzas, K. (2003). Early childhood teachers' attitudes towards computer and information technology: The case of Greece. Information Technology in Childhood Education Annual. 183-207.

Veen, W. (2002). 'Celebrating Homo Zappiens: Adapting to new ways of learning using ICT', British Council's Learning for All in a Global Society Seminar Series: Seminar A, Retrieved from the World Wide Web: http://www.britishcouncil.org/education/conference/2002/seminars/seminar_a.doc

White, R. and Wyn, J. (2004) *Youth and Society: Exploring the Social Dynamics of Youth Experience*. Oxford University Press: Melbourne.

International Journal of Education and Development using Information and Communication Technology (IJEDICT), 2006, Vol. 2, Issue 2, pp. 35-50.

Jordanian EFL students' perceptions of their computer literacy

Ruba Fahmi Bataineh and Abdallah Ahmad Baniabdelrahman
Yarmouk University, Jordan

ABSTRACT

This study investigated 210 Jordanian EFL perceptions of their computer literacy. The findings revealed that the majority of the students reported being fairly proficient to proficient in computer skills such as deleting files (81.43%), copying files (78.57%), formatting a floppy disk (67.15%), and installing a program on a hard disk (64.29%), while most reported being not or a little proficient in computer skills such as using images from a camcorder or digital camera in computers (84.76%), using PowerPoint (80%), and creating databases (78.09%). The results further revealed no significant effect for gender but a significant effect for year of study on students' perceptions of their computer literacy.

Keywords: *Jordan; computer-assisted language learning (CALL); computer-mediated communication (CMC)*

INTRODUCTION AND BACKGROUND

Research on the effectiveness of computers in language teaching has been an ongoing process. Warschauer and Healey (1998) claim that that use of computers has changed drastically in the past thirty years from computer-fed drills to long-distance communication and collaboration in authentic research and multimedia publication. Warschauer and Healey (1998) divide the past four decades of computer-assisted language learning (henceforth, CALL) into three stages: behaviorist CALL which featured the drill-and-practice method based on the behaviorist learning model in which the computer was viewed as a mechanical, tireless tutor (Ahmad et al, 1985); communicative CALL which recognized language learning as a creative process of discovery, expression, and development; and integrative CALL which emphasized real language use in a meaningful and authentic context.

The use of computers in the classroom has proven advantageous in more than one respect. Not only has it been found to facilitate student learning (Goldman et al, 1999; Heinecke et al, 1999) but it has also been found to develop students' ability to learn independently, analyze information, think critically, and solve problems (Chavez, 1997). Kulik et al (1983) report significant increases in students' reading speed and comprehension across studies of computer-assisted reading instruction. Frizler (1995) claims that even though they will never replace teachers, computers can provide excellent and fairly inexpensive supplementary materials to enhance classroom instruction. Furthermore, computers have been found not only to promote visual, verbal and kinesthetic learning, higher-level thinking, and problem solving (Turnbull and Lawrence, 2002) but also to offer immediate feedback, hands-on learning, and collaborative instruction (Koller, 1996; Silva et al, 1996; González-Bueno, 1997; Chavez, 1997; Dahlgren, 1998; Drake, 1998; Schulz, 1999).

However, despite the potential benefits of using technology in the classroom, some teachers were found to shy away from using it effectively or at all, which may bring into focus the role of teacher training programs not only in helping teachers use technology effectively (Wenglinsky, 1998; Rowand, 2000) but also to change some of their practices and attitudes towards teaching and learning (Dwyer, 1990).

In a fairly recent book of case studies on computers in the classroom, Cuban (2001) examines issues of how computers are being used for instruction; how teaching and learning have changed as a result of steady increases in hardware and software in schools in the last two decades; and whether or not the investment in new technologies has been worth the cost. He (:179) claims that "computers have been oversold and underused, at least for now".

Sandholtz et al (1997) divide technology integration into five phases: entry, adoption, adaptation, appropriation, and invention. The entry stage is characterized by the teacher's use of text-based materials with traditional, teacher-centered instructional activities; the dominant instructional technologies at this stage include blackboards, textbooks, workbooks, and overhead projectors. At the adoption stage, at which traditional whole-group lecture and seatwork still dominate instructional strategies, instructional activities include keyboarding, word-processing, and drill-and-practice. At the adaptation stage, traditional instruction prevails, but some class time is allowed for students to use computers for homework and daily class work, while at the appropriation stage, teachers integrate technology regularly into the curriculum. Invention is characterized by the teachers' attempt to find new ways to connect students and use project-based and interdisciplinary approaches to instruction.

Cuban (2001:50) found that most pre- and elementary schools remained at the adoption level; that the use of computers was less important than cultivating social, civic, and academic values in children; and that traditional models of instruction were sustained rather than transformed. He also found that American university students usually use computers for word processing, to search the Internet, and for e-mail while professors use computers for their research rather than in the classroom. He further pointed out that lectures remain the dominant means of instructional delivery in American undergraduate classes, and that traditional methods of instruction have changed very little in the past few decades.

Even though computer-mediated communication (henceforth, CMC) in the foreign language classroom is a relatively young field, research suggests that CMC does have benefits over traditional teaching methods. Claims have been made about the dramatic effect of CMC on various communication processes (Hiltz and Turoff, 1978). Others claim that electronic communication provides more writing practice (DiMatteo, 1991), encourages co-operation between students (Barker and Kemp, 1990) and facilitates peer editing (Moran, 1991). Unlike face-to-face discussions, CMC has been found to facilitate more balanced student participation (Sproull and Kiesler, 1991).

Despite the benefits of using the computer in language teaching and learning, there has been a shortage in its use in the Jordanian classroom. However, over the last few years, Jordan has implemented educational reform measures to improve the quality of education, computerize schools, modernize curricula and teaching methods, enhance teaching-learning processes, and ensure equal access for the poor in regards to basic education (The Jordanian Ministry of Planning and International Cooperation, 2002).

Currently all secondary schools in Jordan have fully equipped computer labs, and asymmetric digital subscriber line (ADSL) connectivity has reached over 2010 of Jordan's 3000 public schools. The number of teachers trained on the International Computer driver's License (ICDL) was 43,000 in May 2004 and is expected to reach 60,000 by year end. Additionally, 65,000 personal computers (PCs) are currently installed in 2,250 public schools, bringing the ratio of student to PC from 43:1 in 2001 to 15:1 in 2004.

Through the Social and Economic Transformation Program (SETP), the Jordanian Government has engaged in the process of reforming and upgrading its higher education institutions through (i) computerizing universities; (ii) modernizing curricula; (iii) providing for better learning environments; (iv) encouraging research; (v) providing the institutional framework for improving the accreditation system; (vi) encouraging private sector investment; and (vii) monitoring the performance of higher education institutions.

Objectives of the study

Since the literature seems to support the notion that language teachers need to be computer literate, this study aims to investigate Jordanian EFL students perceptions of their computer literacy as a means to identify the kind of training Jordanian pre-service teachers may need to cope with the country's new trend towards information technology. In order to achieve the objectives of the study, the following research questions are addressed:

- How do the students perceive their level of computer literacy?
- What do the students perceive as the factors that limit their use of the computer?
- Are there significant differences in the students' use of the computer which can be attributed to the variables of gender and year of study?

Significance and limitations of the study

While some foreign research examines ESL students' attitudes and beliefs towards computer use (cf., for example, Brett, 1996; Davis and Lyman-Hager, 1997; Warschauer, 1996a and 1996b), very little research has been published about students' perceptions of their computer literacy, especially in third world countries.

In light of the several current computer-related educational reforms in Jordanian institutions of learning, the results of the present study are expected to provide valuable information to bridge the gap in the literature about computer use in the third world countries, represented here by Jordan. The present research is also hoped to establish grounds for further research in this area.

However, the generalizability of the findings may be limited due to the fact that the present study focuses solely on Jordanian EFL university students' perceptions of their computer literacy. The data do not confirm that the respondents are indeed as proficient as they perceive themselves to be.

RELATED LITERATURE

Despite the fact that the use of computers in the foreign language classroom is still a relatively young field, previous research suggests that it has advantages over traditional teaching methods.

Turnbull and Lawrence (2002) surveyed 88 Canadian 4^{th}, 6^{th}, 8^{th}, 10^{th}, and 12^{th} grade students to find out their computer use at home and school, perceptions of the impact of computers on their learning, recommendations for frequency of computer use in foreign French classes, and problems with computers. About 87% of the students reported having a computer at home, 83% of students reported enjoying using computers, while the respondents reported a wide range of computer use at home with 77% for school projects, 68% for games, , 66% for the Internet, , 65% for e-mail, 55% for chat, and 53% for CD-Rom. Similarly, a wide range of computer use was reported in foreign French classes with the Internet, word processing, and projects using technology topping the list with 80%, 63%, and 56%, respectively.

About 66% of the respondents reported a preference for project-based computer work in foreign French classes, while 47% reported liking Internet use, 15% software, and 14% word processing. About 70% of the respondents believed that they learned more when computers were part of their French classes, while 89%, 86%, and 84% reported feeling that computers facilitated their reading skills, writing skills, and vocabulary acquisition, respectively. An overwhelming 89% reported feeling that computers helped them learn better on their own.
In response to their problems with computers, 50% of the respondents reported problems related to Platform issues (Mac vs. PC), while smaller percentages reported technical problems (41%), writing on the computer in French (38%), lack of computers (34%), slow computers (28%), and teachers' inability to help (22%).

Cuban (2001) reports that surveys conducted at Stanford University in 1989 and 1997 indicated that the overhead projector and VCR were the two most frequently used machines in the classroom. The findings further revealed that computers, while used in the preparation for instruction, are very rarely utilized during the instructional process. Cuban (2001:132-133) has further found that (i) teachers are not technophobes; (ii) most teachers do not use computers during class time; (iii) most high school students do not have a "tech-heavy" experience; (iv) most teachers are not serious users of technology; (v) when computer use occurred, it was most often peripheral to instructional tasks; (vi) there is no concrete evidence of gains in academic achievement as the result of using computers; (vii) the majority of teachers using computers maintain existing practices of teaching; and (viii) few students used technologies at the invention level. Cuban also reported little to no use of computers in American foreign language classrooms.

Egbert et al (2002) examined how 20 English as a second language and foreign language teachers apply practical experiences from CALL coursework to their teaching and how teachers continue their CALL professional development. Their findings suggest that teachers who use CALL activities are often those who had prior experience with CALL; that lack of time, support, and resources prohibits the use of CALL activities while more time, more resources and better support enable CALL use; and that colleagues are the most common resource of new CALL activity ideas outside of formal coursework.

Some research has found that most teachers do not learn to use computers through coursework which seems to have little or no effect on pre-service teachers' beliefs about their abilities or use of what they have learned in their actual teaching practice. Langone et al (1998) found that although teachers do learn new skills as a result of instruction, they do not necessarily use those skills in their daily practice. Galloway (1997) found that most of his respondents reported using word processing most, while few reported using telecommunications, hypermedia, databases, or spreadsheets. Along the same lines, Smerdon et al (2000) reported that teachers use technology most frequently to prepare or supplement instruction rather than for purposes of instructional delivery.

Despite these findings, research suggests a correlation between changes in pre-service teachers' perceptions and classroom technology use. Pre-service teachers' confidence in computer use has been found to improve through formal teacher education coursework (Knezek et al, 1996) as do their attitudes towards computers (Lam, 2000). Grau (1996) reports that after a one-semester technology course, while a small percentage (22%) of the pre-service teachers equally perceived their computer skills as being above average or below average, 75% of these teachers reported using computers in their first year of teaching (mainly word processors and grade books). Smerdon et al (2000) also found that even more experienced teachers use the computer mainly for word processing, spreadsheets, drills, and, to some extent, Internet research and problem-solving.

Abdal-Haqq (1995) argues that teachers are not integrating advanced technologies into their syllabi, possibly because teacher education in computers often focuses on "older and simpler instructional applications of computer technology" rather than multimedia, problem-solving applications, and other newer tools. A large body of research points to the pervasiveness of computer use for word processing (cf., for example, Levy, 1997; Strudler et al, 1999). The literature points to a host of factors which may either support or prohibit the use of technology in the classroom use such as age, gender, attitudes toward technology, teaching experience (Lam, 2000), and the rate of technological change (Levy, 1997).

Facilitating factors range from pre-service use, perception of the usefulness of technology for teaching, and overcoming technology-related anxiety (Knezek et al, 1996). Peer collaboration in situated learning contexts seems to have an impact on teacher learning (Smerdon et al, 2000; Fisher, 1999). Instructional programs seem to play a key role in teachers' personal use and in their instructional delivery because technology is contextualized and teaching and learning take place simultaneously. Reed et al (1995) claim that as few as one computer course can positively affect teachers' attitudes toward computers. Fisher (1999) found that teachers' attitudes were strongly related to their success in using technology. Lam (2000) reported factors related to whether technology is useful for job performance and how easy it is to use. Yildirim (2000) reported the current uses of the technology in their schools and having a computer at home as factors which may influence teachers' computer use.

Obstacles include time pressures both outside and during class (Lam, 2000; Levy, 1997a; Reed et al, 1995; Smerdon et al, 2000; Strudler et al, 1995); lack of resources and materials (Loehr, 1996; Smerdon et al, 2000); insufficient or inflexible guidelines, standards, and curricula (Langone et al, 1998); lack of support or recognition for integrating computers (Grau 1996; Strudler et al, 1999); a clash between new technologies at universities and older ones in schools; lack of leadership (Smerdon et al, 2000); and inadequate training and technical support (Abdal-Haqq, 1995; Lam, 2000; Langone et al, 1998; Levy, 1997; Smerdon et al, 2000).

The majority of the research on the effect of gender on computer user's attitudes and literacy suggests that male users have more positive attitudes towards computers (Anderson, 1987; Nickell and Pinto, 1986; Comber et al, 1997) and a higher perceived computer knowledge than their female counterparts (Geissler and Horidge, 1993; Smith and Necessary, 1996).

SAMPLE, INSTRUMENTATION AND DATA COLLECTION

The population of the study consisted of all the EFL students at the Departments of Curriculum and Instruction and English at Yarmouk University in the second semester of the academic year 2003/2004. The sample of the study consisted of 210 (56 male and 154 female) EFL students, of whom 49 are freshmen, 50 sophomores, 40 juniors, and 71 seniors.

Based on their collective experience and a thorough review of the literature, the present researchers designed the research instrument and procedures. They designed a questionnaire after those of Porter (1997) and Mubireek (2001). The validity of the questionnaire was established by a jury of four EFL professors, three EFL supervisors, and five English language teachers whose comments were used to modify the questionnaire. The reliability of the questionnaire was established by piloting the study using test-retest on twenty-one EFL students who were excluded from the sample with a twenty-day interval between the two administrations of the questionnaire. Pearson correlation coefficient was calculated and found to equal 81.7%.

The questionnaire in its final form consisted of two demographic questions and 25 items which covered the students' perceptions of their computer literacy (19 items) and the factors limiting students' use of the computer (6 items including one open-ended question) (see the Appendix). After establishing the validity and reliability of the questionnaire, a cover letter was written to the participants explaining the purposes of the study and assuring them of the confidentiality and anonymity of their responses. The questionnaire was distributed hand-to-hand to the participants. Of the 280 copies distributed, 210 copies were returned to the researchers, yielding a response rate of 75%.

FINDINGS AND DISCUSSION

Table 1 presents the numbers and percentages of the 19 questionnaire items pertaining to the first research question which addresses the level of the students' computer literacy.

Table 1 shows that 81.43% of the respondents report being either fairly proficient or proficient in deleting files. Similarly, 78.57% of the respondents report being fairly proficient or proficient in copying files, 67.15% in formatting a floppy disk , and 64.29 in installing a program on a hard disk. On the other hand, 85% of the respondents reported being a little or not proficient in using images from a camcorder or digital camera in computer applications, while various percentages of these respondents perceived themselves as being a little or not proficient in opening and using more than one file simultaneously (55.72%), searching a database system for specific information (58.57%), accessing information on a CD-ROM (59.05%), printing selected information from a database (62.86%), troubleshooting a malfunctioning printer (67.14%), using a database, spreadsheet or word processing software to create tables and figures (67.62%), using presentation software to create a lesson or a lecture (68.57%), using graphics software to create pictures (71.43%), creating a newsletter with desktop publishing (74.51%), creating a spreadsheet (75.72%), creating a database (78.09%), and using PowerPoint in the classroom (80%).

The findings reveal that the students are proficient to fairly proficient in lower-order computer skills but a little to not proficient in higher order computer skills, which may be attributed to the fact that their basic purposes for using the computer are oftentimes limited to word processing and electronic mail. Other higher-order skills are often foreign to these students, which may explain their perceptions of weakness in these skills.

Six questionnaire items (see the Appendix) were used to answer the second research question which investigates the factors the respondents perceive to limit their computer use. Table 2 below presents the frequencies and percentages of the respondents' answers.

Table 1: *Numbers and Percentages of the Students' Responses concerning their Computer Literacy*

Item No.	Item	Not Proficient		A Little Proficient		Fairly Proficient		Proficient	
		#	%	#	%	#	%	#	%
1	**Use word processor to create and print a document**	51	24.29	57	27.14	51	24.29	51	24.29
2	**Format a floppy disk**	24	11.43	45	21.43	48	22.86	93	44.29
3	**Copy files**	27	12.86	18	8.57	57	27.14	108	51.43
4	**Delete files**	18	8.57	21	10.00	69	32.86	102	48.57
5	**Install a program on a hard disk**	39	18.57	36	17.14	72	34.29	63	30.00
6	**Access information on a CD-ROM**	60	28.57	64	30.48	35	16.67	51	24.29
7	**Search a database system for specific information**	75	35.71	48	22.86	54	25.71	33	15.71
8	**Print selected information from a database**	69	32.86	63	30.00	33	15.71	45	21.43
9	**Create a database (e.g., Paradox, Access)**	112	53.33	52	24.76	35	16.67	11	5.24
10	**Create a spreadsheet**	108	51.43	51	24.29	21	10.00	30	14.29
11	**Create a newsletter with desktop publishing**	99	47.37	57	27.14	27	12.86	27	12.86
12	**Use graphics software to create pictures**	81	38.57	69	32.86	28	13.33	32	15.24
13	**Use database, spreadsheet or word processing software to create tables and figures**	99	47.14	43	20.48	37	17.62	30	14.29
14	**Use a scanner to import graphics**	62	29.52	45	21.43	61	29.05	42	20.00
15	**Open and use more than one file simultaneously**	69	32.86	48	22.86	54	25.71	39	18.57
16	**Troubleshoot a malfunctioning printer**	78	37.14	63	30.00	42	20.00	27	12.86
17	**Use PowerPoint in the classroom**	111	52.86	57	27.14	33	15.71	9	4.29
18	**Use images from a camcorder or digital camera in computer applications**	132	62.86	46	21.90	29	13.81	3	1.43
19	**Use presentation software to create a lesson or a lecture**	108	51.43	36	17.14	30	14.29	36	17.14

Table 2: *Frequencies and percentages of the students' responses concerning the factors limiting their use of the computer*

Item No.	Item	Missing	Never		Almost Never		Rarely		Occasionally		Frequently		Very Frequently	
			#	%	#	%	#	%	#	%	#	%	#	%
1	Time	45	36	21.82	41	24.85	27	12.86	55	26.19	6	3.64	0	0
2	Inadequate number of computers	38	6	3.49	17	9.88	11	6.40	43	25.00	56	32.56	39	22.67
3	Hardware problems	34	9	5.11	42	23.86	31	17.61	32	18.18	30	17.05	32	18.18
4	Lack of experience in computer use	38	27	15.70	35	20.35	48	27.91	51	29.65	5	2.91	6	3.49
5	Slow computers	43	21	12.57	33	19.76	53	31.74	42	25.15	12	7.19	6	3.59
6	Other	43	36	21.56	30	17.96	51	30.54	32	19.16	13	7.78	5	2.99

Table 2 shows that the two major factors which frequently or very frequently limit the students' use of the computer are the inadequate number of computers (55.23%) and hardware problems such as a malfunctioning disk drive, mouse, keyboard, or microphone (35.23%). Smaller percentages of respondents perceived slow computers (10.78%,), lack of experience in computer use (6.40%), and time (3.64) to pose serious limitations.

These findings may be attributed to the fact that the respondents' computer use is limited to basic functions such as word-processing and electronic mail, which may further explain why the respondents perceive inadequate numbers of computers and hardware problems as the major obstacles they face while other obstacles such as slow computers were not perceived as potentially serious. Routine computer functions do not require speed, specialized knowledge in computer use, or a lot of time to perform satisfactorily.

To answer the third research question, which is concerned with whether or not there are any significant differences in the students' computer literacy, Two-Way Analysis of Variance (ANOVA) test was used. The results are presented in Tables 3 and 4, below.

Table 3: *Means and Standard Deviations of the Students' Perceptions of their Computer Literacy*

Dependent Variable	Year	n	Mean	SD
Computer Literacy	1	49	23.89	14.21
	2	50	21.10	7.61
	3	40	24.25	10.28
	4	71	28.46	13.84

Table 4: *ANOVA Statistics for the Effect of Gender and Year of Study on Students' Perceptions of their Computer Literacy*

Source	DF	SS	MS	F-Value	Pr>F
Gender	1	293.61	293.61	2.14	0.1448
Year of Study	3	1931.71	643.91	4.70	0.0034**
Within Groups	204	27958.81			
Total	208	29957.52			

** Significant at α = 0.05

The findings do not reveal any significant effect of gender on the respondents' perceptions of their computer literacy (F(1, 0.05) = 2.14; P=0.1448). Although this result contradicts those of previous research (cf., for example, Anderson, 1987; Nickell and Pinto, 1986; Comber et al, 1997; Geissler and Horidge, 1993; Smith and Necessary, 1996), it may be explained in light of the fact that both male and female students at Yarmouk University study the same courses under the same conditions.

However, the results of the Two-Way Analysis of Variance (ANOVA) between groups design reveal a significant effect for the variable of the year of study on the students' mean scores in computer literacy (F (3, 0.05) = 4.70; P=0.0034).

Table 5 presents the findings of the multi-comparisons of the students' responses according to the variable of year of study.

Table 5: *Tukey Test of Multi-Comparisons of Students' Perceptions of their Computer Literacy according to Years of Study*

Years	Mean Difference	95% Confidence Interval
1 2	1.79	- 3.38 8.96
1 3	-0.36	- 6.88 6.17
1 4	-4.58	-10.27 1.11
2 3	-3.15	-9.58 3.28
2 4	-7.38	-12.96 -1.79**
3 4	-4.22	-10.20 1.76

** Significant at α = 0.05

As shown in Table 5, Tukey test of multi-comparisons reveals a significant difference between the mean scores of second and fourth year students in favor of fourth year students in computer literacy. Fourth year students were found to perceive themselves as more proficient in using the computer than their second year counterparts although the findings do not reveal any significant differences among the other years of study in computer literacy.

This curious result may be attributed to the fact that computer use is more prevalent among more advanced students than those in their early years of study. It may be the case that first-year students are not aware of their computer proficiency simply because they have not yet been given opportunities to put it to the test. Due to exposure to computer use, possibly for the first time, second year students are made aware of their limitations in computer literacy, a problem which may diminish with time and increasing exposure best available to fourth-year students.

IMPLICATIONS AND RECOMMENDATIONS

A lot of research has been conducted on the effect of computer use on various aspects of the educational process. However, although the literature emphasizes the strong relationship between users' proficiency in and attitudes towards using the computer, it has little research on the users' perceptions of their computer literacy and the obstacles that face them, especially in third world countries. The present researchers urge scholars to conduct further research on students and teachers' need for and attitudes towards computer use for educational purposes, on the effect of computer use on teaching/learning the various skills, on contextualizing/ providing a cultural context for foreign language learning, on promoting learner autonomy and independent learning, and on developing students' critical thinking and problem-solving abilities within the Jordanian and Arab World context to bridge the gap in the current literature.

REFERENCES

Abdal-Haqq, I. (1995). Infusing technology into preservice teacher education. ERIC Digest. Available online at: http://www.ed.gov/databases/ERIC_Digests /ed389699.html [accessed December 2, 2004].

Ahmad, K., Corbett, G., Rogers, M., and Sussex, R. (1985). Computers, language learning and language teaching. Cambridge, Great Britain: Cambridge University Press.

Anderson, M.J.W. (1987). Gender differences in computer attitudes, interests, and usage at an elite high school. Unpublished Doctoral Dissertation, Virginia Polytechnic Institute and State University, Virginia (U.S.A).

Azan Mat Zin, N., Zaman, H.B., Judi , H.M., Abdul Mukti , N., Amin, H.M., Sahran, S., Ahmad, K., Masri, A., Abdullah, S., and Abdullah, Z. (2000). Gender differences in computer literacy level among undergraduate students in Universiti Kebangsaan Malaysia (UKM). Retrieved December 6 2004 from http://www.ejisdc.org.

Barker, T. and Kemp, F. (1990). Networking theory: A postmodern pedagogy for the written classroom. In C. Handa (Ed.), Computers and community: Teaching composition in the twenty-first century (1-27). Portsmouth, New Hampshire: Heinemann.

Brett, P. (1996). Using multimedia: An investigation of learners' attitudes. Computer Assisted Language Learning, 98, 191-212.

Chavez, C. (1997). Students take flight with Daedalus: Learning Spanish in a networked classroom. Foreign Language Annals, 30 (1), 27-37.

Comber, C., Colley, A., Hargreaves, D.J., and Dorn, L. (1997). The effects of age, gender and computer experience upon computer attitudes. Educational Research, 39, 123-133.

commitment to learning. Journal of Research on Computing in Education, 25(3), 347- 365.

Cuban, L. (2001). Overbought and undersold: Computers in the classroom. Cambridge, Massachusetts: Harvard University Press.

Dahlgren, S. (1998). Technology: Tools for teaching and learning. Unpublished Masters Thesis, Black Hills State University, Spearfish, South Dakota (U.S.A).

Davis, J.N. and Lyman-Hager, M. (1997). Computers and L2 reading: Student performance, student attitudes. Foreign Language Annals, 30, 58-72.

DiMatteo, A. (1991). Communication, writing, learning: An anti-instrumentalist view of network writing. Computers and Composition, 8(3), 5-19.

Drake, S. (1998). Creating integrated curriculum. Thousand Oaks: Corwin Press.

Dwyer, D.C. (1990). The evolution of teachers' instructional beliefs and practices in high-access-to-technology classrooms. Paper presented at the Annual Meeting of the American Educational Research Association, Boston, Massachusetts (U.S.A).

Egbert, J., Paulus, T.M., and Nakamichi, Y. (2002).The impact of call instruction on classroom computer use: A foundation for rethinking technology in teacher education. Language Learning and Technology, 6(3), 108-126.

Extension Educators. Unpublished Doctoral Dissertation, The Ohio State University, Ohio (U.S.A).

Fisher, T. (1999). A new professionalism? Teacher use of multimedia portable computers with Internet capability. Paper presented at SITE 99. (ERIC Document No. 432268)

Frizler, K. (1995). The Internet as an Educational Tool in ESOL Writing Instruction Unpublished Master's thesis, San Francisco State University. Retrieved November 3 2004 from http://thecity.sfsu.edu/~funweb/thesis.htm

Galloway, J.P. (1997). How teachers use and learn to use computers. Technology and Teacher Education Annual, 857-859.

Geissler, J. and Horridge, P. (1993). University students' computer knowledge and

Goldman, S., Cole, K. and Syer, C. (1999). The technology/content dilemma. Paper presented at the Secretary's Conference on Educational Technology. Retrieved June 3 2004 from http://www.ed.gov/technolology/techConf/1999/whitepapers/paper 4.html

Gonzalez-Bueno, M. (1997). Voice-onset-time in the perception of foreign accent by native listeners of Spanish. IRAL, 35 (4), 251-267.

Grau, I. (1996). Teacher development in technology instruction: Does computer coursework transfer into actual teaching practice? Paper presented at the Annual Meeting of the Southwest Educational Research Association, Dallas, Texas (U.S.A). (ERIC Document Reproduction Service No. ED394949)

Heinecke, W. F., Blasi, L., Milman, N., and Washington, L. (1999). New directions in the evaluation of the effectiveness of educational technology. Paper presented at The Secretary's Conference on Educational Technology 1999. Retrieved June 3 2004 from http://www.ed.gov/TechConf/1999/whitepapers/paper8.html

Hiltz, S.R. and Turoff , M. (1978). The Network Nation. Cambridge, MA: MIT Press.

The Jordanian Ministry of Planning and International Cooperation (2002).SETP Achievements. Retrieved June 3 2004 from http://www.mop.gov.jo/page.php? menu_id=422

Knezek, G., Chiristensen, R., and Rice, D. (1996). Changes in teacher attitudes during information technology training. Technology and Teacher Education Annual, 6, 763-766.

Koller, E. (1996). Overcoming paradigm paralysis: A high school teacher revisits foreign language education. Teachers Doing Research. Mahwah, New Jersey: Erlbaum. 180-191.

Kulik, J. A., Bangert, R. L., and Williams, G.W. (1983). Effects of computer-based teaching on secondary school students. Journal of Educational psychology, 75, 19-26.

Lam, Y. (2000). Technophilia v. technophobia: A preliminary look at why second language teachers do or do not use technology in their classrooms. Canadian Modern Language Review, 56, 389-420.

Langone, C., Wissick, C., Langone, J., and Ross, G. (1998). A study of graduates of a technology teacher preparation program. Journal of Technology and Teacher Education, 6(4), 283-302.

Levy, M. (1997). Computer assisted language learning: Context and conceptualization. Oxford: Clarendon Press.

Loehr, M. (1996). Top ten media competency recommendations by teachers for teacher training. Technology and Teacher Education Annual, 1996, 474-476.

Moran, C. (1991). We write, but do we read? Computers and composition, 8(3), 51-61.

Mubireek, S. (2001). Level of Adaptation of the Internet by ESL Teachers at the OHIO State University. Unpublished Doctoral Dissertation, The Ohio State University, Ohio (U.S.A).

Nickell, G.S. and Pinto, J.N. (1986). The Computer Attitude Scale. Computers in Human Behavior, 2, 301-306.

Porter, T. (1997). Level of Use of the Internet by the OHIO State University Extension educators. Unpublished Doctoral Dissertation, The Ohio State University, Ohio (U.S.A).

Reed, W., Anderson, D., Ervin, J., Oughton, J. (1995). Computers and teacher education students: A ten year analysis. Journal of Computing in Childhood Education, 6, 5-24.

Rowand, C. (2000). Teacher use of computers and the Internet in public schools. Statistics in Brief (National Center for Educational Statistics) Washington, DC: U. S. Department of Education. Retrieved June 3 2004 from http://nces.ed.gov/pub2000/quarterly/summer/3elem/q2-3.html

Sandholtz, J., Ringstaff, C., and Dwyer, D. (1997). Teaching with technology. New York: Teachers College Press.

Schulz, R.A. (1999). Foreign language: Instruction and curriculum. The Educational Digest, 64 (7), 29-37.

Silva, P.U., Meagher, M.E., Valenzuela, M., and Crenshaw, S.W. (1996). E-mail: Real-life classroom experiences with foreign languages. Learning and Leading with Technology, 23 (5), 10-12.

Smerdon, B., Cronen, S., Lanahan, L., Anderson, J., Iannotti, N., and Angeles, J. (2000). Teachers' tools for the 21st century: A report on teachers' use of technology. Washington, DC: National Center for Education Statistics.

Smith, B.N. and Necessary, J.R. (1996). Assessing the computer literacy of undergraduate college students. Education, 117(2), 188-194.

Sproull, L. and Kiesler, S. (1991). Connections: New ways of working in the networked organization. Cambridge, Massachusetts: MIT Press.

Strudler, N., McKinney, M., and Jones, W. (1999). First-year teachers' use of technology: Preparation, expectations and realities. Journal of Technology and Teacher Education, 7(2), 115-129.

Turnbull, M. and Lawrence, G. (2002). Computers make sense according to brain research…but what do students think? *Canadian Association of Second Language Teache*rs. Retrieved December 3 2004 from http://www.caslt.org/

Warschauer, M. (1996a). Comparing face-to-face and electronic communication in the second language classroom. CALICO Journal, 13 (2), 7 - 26.

Warschauer, M. (1996b). Motivational aspects of using computers for writing and communication (online). Second Language Teaching and Curriculum Center.

Warschauer, M. and Healey, D. (1998). Computers and language learning: An overview. Retrieved August 6 2004 from http://www.gse.uci.edu/markw/call.html

Wenglinsky, H. (1998). Does it compute? The relationship between educational technology and student achievement in mathematics. Princeton, New Jersey (U.S.A): Educational Testing Service.

Yildirim, S. (2000). Effects of an educational computing course on preservice and inservice teachers: A discussion and analysis of attitudes and use. Journal of Research on Computing in Education, 32(4), 479-495.

APPENDIX
The Questionnaire

Demographic Information
Year of Study
First year
Second year
Third year
Fourth year
Gender
Male
Female
Please place a (√) in the column that corresponds to your level of proficiency for each of the following skills.

How proficient are you in the following skills?

No.	Skill	Not Proficient	A Little Proficient	Fairly Proficient	Proficient
1	**Use a word processor to create and print a document**				
2.	**Format a floppy disk**				
3.	**Copy files**				
4.	**Delete files**				
5.	**Install a program on a hard disk**				
6.	**Access information on a CD-ROM**				
7.	**Search a database system for specific information**				
8.	**Print selected information form a database**				
9.	**Create a database (e.g., Paradox, Access)**				
10.	**Create a spreadsheet**				
11	**Create a newsletter with desktop publishing**				
12.	**Use graphics software to create pictures**				
13.	**Use a database, spreadsheet or word processing software to create tables and figures**				
14.	**Use a scanner to import graphics**				
15.	**Troubleshoot a malfunctioning computer**				
16.	**Open and use more than one file simultaneously**				
17.	**Use PowerPoint in the classroom**				
18.	**Use images from a camcorder or digital camera in computer applications**				
19.	**Use presentation software to create a lesson or a lecture**				

Part 2: Difficulties Limiting Students' use of the computer

How frequently do the following cause you problems in using the computer?

No.	Item	Never	Almost Never	Rarely	Occasionally	Frequently	Very Frequently
1	**Time**						
2.	**Inadequate number of computers**						
3.	**Hardware problems**						
4.	**Lack of experience in computer use**						
5.	**Slow computers**						

6. Other (mention, please!)

International Journal of Education and Development using Information and Communication Technology (IJEDICT), 2006, Vol. 2, Issue 2, pp. 51-59.

Trends and challenges of eLearning in national and international agricultural development

John Leary and Zane L. Berge
UMBC, USA

ABSTRACT

Compared to other business and management fields, elearning in agriculture-related fields is still in the early phases of adoption. Early pioneers, primarily American and Australian agribusinesses and colleges of agriculture, are now utilizing elearning methods as a major part of both their education and strategic management programs. There are plenty of challenges, involving the faculty and trainers, students and farmers, technology, finances, and other complications, but agricultural instructors absolutely must find ways to overcome these hindrances and aspire toward the plethora of opportunities that elearning presents for the field of agriculture. eLearning is dramatically improving how agricultural education is done. It is allowing greater access to more students and farmers, more efficiently, with better information. The evaluation results of the first international elearning projects in agriculture show that much good can be done toward ensuring food security in the world if developed countries assist developing countries to implement elearning methods. This paper explains the major trends in elearning in agriculture and the challenges of elearning in agriculture. It describes the major developments and uses of elearning in the field of agriculture and investigates the international opportunities with elearning in agriculture.

Keywords: *elearning; classrooms applications of technology; agricultural education.*

INTRODUCTION

The need for improved agricultural education throughout the world has never been greater. Agricultural technologies that can increase food security in the developing world while developing income-generating activities and conserving environmental resources do exist. Many of these technologies have existed for decades, yet famine, hunger, desertification, deforestation and droughts continue to plague the world's developing countries, which are least prepared to deal with these devastating problems. In developed countries, farmers are facing a changing atmosphere in which organic foods, new methods in raising animals, disease outbreaks, agribusiness, crop insurance, and banking all continually present new challenges. Hundreds of thousands of small farms throughout North America, Europe and Australia have been forced to close in recent years. All of these problems do have workable solutions, yet the global difficulty is getting the appropriate information to farmers. eLearning can benefit every agricultural community around the world, from research scientists in American universities to the poor subsistence farmers of developing countries. It can benefit persons of all ages, all locations, and bridge the gaps created by mountains, deserts, oceans, wars, and political boundaries. eLearning in agriculture can assemble resources and knowledge from distant places that may otherwise be unobtainable. It can connect farmers with far away researchers and experts. It can also dramatically increase the numbers of farmers who can be reached by single training programs. Despite its potential omnipresence, there is a significant rift between high-quality and low-quality agricultural elearning programs.

Most elearning programs in agriculture currently being undertaken in the world are in the pioneering phase. These efforts are attempting to use low-risk, low-cost elearning technologies. Services tend to be free and are studies, pilot projects, and other initiatives supported by grants. Many of these projects are not sustainable; after a limited number of training sessions they end when the funding ends, perhaps with a research report published on the Internet and an expectation that individuals can find it, fully accept it, and integrate the findings into training curricula. At the same time, universities, businesses, and some well-funded international development organizations are producing and utilizing high-quality elearning programs backed by trained personnel and resources.

MAJOR TRENDS – A GLOBAL PERSPECTIVE

Adoption curves show that diffusion of innovations is slow during the initial efforts and later widely accepted into the main stream. The early pioneers and adopters struggle to establish elearning but eventually begin to pick up momentum. After having proven their effectiveness in helping groups to achieve a competitive advantage, pragmatists and conservatives join the elearning 'bandwagon' and the elearning adoption curve rises significantly as elearning methods become widely utilized.

Training delivered via elearning is rising quickly in nearly every field of work. Throughout North America, Australia and Europe, elearning in non-agricultural sectors is becoming widely used. Though no sector has reached 100% adoption, a vast majority has adopted elearning in their training programs. eLearning in Canadian, European, American, and Australian agriculture falls significantly behind the current adoption rates seen in non-agricultural sectors. Though the Australian agricultural sector had an earlier start, just ahead of the Americans in elearning during the mid-1990's, Americans and Europeans quickly caught up (AAC 2003). With regard to elearning, the Canadian agriculture sector currently lags behind the other countries just mentioned. Still, because of its massive stretches of land among extension agents and farms, Canada's Agricultural Policy Framework is investing in major increases in elearning throughout the country. Each of these developed countries are linking learning to marketable skills and selling e-training programs for specific agricultural training purposes. This is seen in the recent increase in Masters programs for agriculturally-related topics, including agriculture, agronomy, agribusiness, and management. The rest of the world, including Latin America, the Caribbean, Africa and much of Asia, are quickly adopting elearning with the help of international partners.

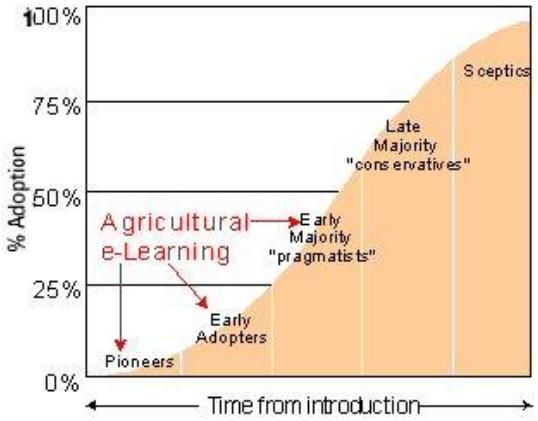

Figure 1: *Adoption curve for elearning in agricultural sectors (AAC 2005)*

MAJOR CHALLENGES

The major challenges identified by researchers inhibiting the expansion of elearning in agriculture are very similar to the barriers that keep other fields from developing strong elearning programs:

- Gaps between Trainers and Designers
- Challenges Faced by Trainers/Instructors
- Challenges Faced by Students/Farmers

Gaps between Trainers and Designers

Major problems lie in educators' inability to bridge the technical divide. Not only must they identify the knowledge and skills needed by the students and farmers, but they must figure out how to present the material in an appropriate, user-friendly design so that elearners can translate that information into applicable solutions on the farm. "Many extension agents and faculty lack the instructional design competencies to develop courses and programs using distance education delivery strategies" (Raulerson et al. 2004, p. 1005). Teachers and trainers are forced to learn on-the-job how to present their material using elearning. They need on-going support, as well as training, administrative support, and incentives, with few of these currently available to the average agricultural trainer or extension agent.

Challenges Faced by Trainers/Instructors

Instructors in agriculture are faced with similar challenges as those experienced by persons working in other fields. These issues include:

- lack of time and skills needed in adopting new technologies
- lack of both formalized reward system and technical support
- a concern about the loss of the teacher-student relationship
- marketing for programs
- financial rewards
- maximizing returns on their investment in time and money
- major increases in administrative work

Researchers (Murphy & Terry, 1998) vocalized these problems during the 1990's and yet these same problems persist to the present day despite the drop in costs and the gradual improvement of connectivity and design facilities. Agricultural educators should understand that elearning is a major investment in their ability to maximize teaching efficiency and effectiveness in the future. Research has clearly shown that electronic communication, information, and imaging technologies offer delivery methods much more convenient than traditional teaching methods once they surpass the initial load of administrative and skills training in the pioneer phase (Fritz et al. 2002; Murphy & Terry 1998).

Converting previously written documents and lectures into an online teaching is not terribly difficult. The problem is the time and precision that must be applied toward creating an online course while taking advantage of the many benefits offered by electronic resources. Special attention must be paid toward developing the links, review questions, connections to data sources, images, glossaries, and case studies of active learning (Edwards & Eggers 2004). This often presents enormous costs and administrative difficulties.

One cannot simply create a web page or portal including training modules and expect students to come. *If you build it, they may not come*. Marketing is also terribly important for any elearning

program. Marketing through radio, meetings, links, international conventions, trade shows, and a variety of other methods is absolutely necessary for an elearning program to become sustainable.

Challenges Faced by Students/Farmers

Because it is an effective, very flexible delivery method and it brings the added benefit of being able to have experts and specialists from different regions and states in the same class without transportation and lodging costs, many types of students are receptive to using the Internet and elearning (Lippert & Plank 1999). This is particularly pertinent to agricultural training because of the tendency for farmers and experts to be separated by long distances. Yet it is the nature of the material that presents the greatest difficulty from the point of view of the students, who in this case, may be extension agents, farmers, trainers, or agricultural teachers; an important challenge for elearning and distance education in agriculture is the need for a hands-on component (Reid 2001). The root of the question lies in the suitability of elearning delivery systems. Communication media, regardless of whether it is radio, songs, or new elearning methods, "may not be sufficient for farmers to truly learn and fully understand new knowledge, particularly the ecological dimensions of farming practices that are the basis of sustainable agricultural technology," and they also "do not guarantee sustained changes in more strongly held farming attitudes and practices" (Jamias, 2002). Whether using new techniques or new technology, farmers must be provided working examples so they can see them in action with their own eyes. This hands-on component is a major limitation of elearning in agricultural training that must be addressed by local extension agents. Many of the farmers throughout the world are illiterate subsistence farmers. Despite this challenge, elearning programs for developing countries are either targeting the literate and educated extension agents, or they are integrating plenty of audio, pictures, and videos into elearning materials so that literacy is not a barrier. Farmers in the United States present additional challenges because though they are literate, they are often behind on the adoption of technology and use of computers. Recent training by the North Carolina Agricultural and Technical State University intended to train farmers in farm management software soon realized that many farmers needed to begin with training in basic computer use. Despite these challenges, several studies, including one by Lippert and Plank (1999) ultimately proved, with strong support of all of the participating students, that "the Internet can be an effective way to implement an in-service training within the U.S. Cooperative Extension Service." There is little doubt as to elearning's efficacy for training extension agents, the challenge for the future will be to design and market elearning directly for the farmers.

NEW USES OF ELEARNING IN AGRICULTURE

Following are some relatively new cases of elearning in agriculture.

Agricultural Management

Iowa State University and the University of Nebraska-Lincoln created the Agricultural Management e-School (AMES) in 2002 to extend agricultural management education to producers, educators, and service providers. With the assistance of university professors, the program created courses for financial decision-making, farmland ownership and leasing agreements, machinery economics, swine marketing and other topics. Each topic contained a module with similar instructional elements, such as outline, content, summary, review questions, exercises, case studies, links to outside resources, and threaded discussions. Because of the technical and knowledge support from many university professors and technicians, this program grew into a large, asynchronous e-School that taught 338 students in its first three years. Through a well-written article in the American Journal of Agricultural Economics, Edwards and Eggers

(2004) presented many useful recommendations derived from the development and implementation of the AMES. The AMES has received strong feedback from a growing number of students. The challenge now is to fully exploit electronic media, maximizing its usefulness and the realm of possible resources to improve elearning in agricultural management.

Agribusiness

> *"Not only is agriculture a business, but programs change, whether with the bank or the government that agriculture depends on. You have to have skills where you're able to make rapid changes in your decision, you have to be able to read a profit loss statement and put one together and interpret with your banker. Farming is like any other career these days and it changes so rapidly that if you're doing the same thing you did five years ago, you're not going to make it."*
> *Ricky Gray, Deputy Commissioner for Mississippi Department of Agriculture (Kirkland 2002).*

In today's economic environment, agribusiness is growing in importance. It integrates a variety of disciplines, including economics, trade, finance, production, and banking, with opportunities in both the public and private sectors. There is a growing trend to create online agribusiness programs; there are already at least three (3) distance education masters programs in the United States for agribusiness, including Iowa State and Kansas State universities and the University of Florida. Australia has a similar program at the University of Melbourne. Students who have taken online courses are showing that both their satisfaction with and performance in online agribusiness courses match that of students who take standard classes in-person (Wachenheim 2004).

The private sector has also developed strong usage of elearning and distance education in agribusiness. Many agribusiness firms are currently utilizing elearning as a major component of their education and management strategy. This has created a rift in online agribusiness education, where the major firms are utilizing high quality executive agribusiness programs and other organizations and schools are using lower cost distance education programs that do not come close to using the repertoire of resources made available through elearning (Parton 2001).

Pioneer, Inc., for example, one of the US's leading distributors of agricultural inputs, has abandoned week-long public education programs for e-courses that educate more students and teachers, more efficiently, while greatly improving awareness of their products. Pioneer is using elearning not only to sensitize the Midwest communities about genetically modified crops but also in the training programs for sales agents and young executives.

Agro-Terror Awareness / Pests and Disease Management

The benefits of elearning are making it a major vehicle for agro-terror awareness and disease management. There are numerous opportunities through milk, meat, fruit, vegetable, and grain production and distribution in which terrorists could attack a population. In the United States, biological attacks are of great interest to the Departments of Homeland Security (DHS) and Agriculture (USDA). US supermarkets are filled with food that comes from across the nation and around the world. Aside from prevention, the nation's food producers and distributors must be ready to respond if an attack does occur. At the same time, the world is coping with potential outbreaks of new, rapidly spreading diseases such as the Avian Flu, and to a much lesser extent, Mad Cow Disease. Whether terrorism or diseases, elearning is quickly becoming a major method for prevention and disaster management training.

There are many examples showing the responses to these challenges. The USDA is currently working with the University of Kentucky to produce online agro-terrorism education courses for both responders and industry users (Emergency 2005). Similarly, the USDA's Animal & Plant Health Inspection Service (APHIS) began a project in 2003 that is spending $11 million dollars over five years to improve APHIS' elearning and knowledge management capabilities (EDP 2003). The FAO and other organizations have created online tutorials for animal-to-animal and animal-to-human infections. The benefits of elearning in these programs are obvious: the ability to reach so many concerned and involved individuals throughout the United States and around the world with minimal cost.

INTERNATIONAL POTENTIAL: SELECTED CASE STUDIES

In 1996, when agricultural e-learning programs were just beginning in the United States and Australia, only 11 African countries had Internet access. Four years later, all of Africa's 53 countries had become connected to the world wide web, even though access was limited to the capitals and other major cities (Adomi 2005). These trends are similar to those of developing countries through Asia and Latin America. The global boom in cybercafés, as opposed to connectivity in households as seen in the United States, has made this expansion possible. Despite this slow start and current overall lack of facilities and resources, elearning in agriculture is blossoming due to the recent advances in computers use and connectivity in rural areas.

Canada-Barbados

Professors at McGill University in Québec, Canada, are currently delivering a farm management course to students in the Barbados. Because of its proximity to North America and the high level of connectivity, this program is similar to many of the agriculture-related distance classes and masters programs facilitated inside the US. The major differences are that students are all from the same town, they meet at a local resource center, and they have an on-site learning facilitator to aid in the classes. Otherwise, this Canada-Barbados Farm management course is just like any other web-based distance class (Grenier, 2005).

Pakistan

Neighboring India, another country with strong potential for widespread elearning programs, Pakistan's 75 million farmers presents a great opportunity for elearning in agriculture. Though the average person earns less than $500 per year, Pakistan's telecommunication sector has exploded in recent years. Agriculture is the primary source of income for about half of the country's 150 million inhabitants, and these farmers are spread over 300,000 square miles. Seen as an effective method for poverty alleviation, international NGOs and Pakistan's government are beginning to establish Internet access throughout the rural areas of the country. Surprisingly enough, there are around 3 million Internet users already in Pakistan, aided by the recent surge in numbers of cybercafés. There is an absolute lack of an organized public library system, and therefore the recent effort by Allama Iqbal Open University to establish over 1,400 study centers throughout the country for distance education creates an opportunity for education, increasing the literacy rate in rural areas, and helping the current reconstruction and food security initiatives following the recent earthquake (Mahmood 2005).

Sub-Saharan Africa

eLearning projects in Sub-Saharan Africa have grown significantly since 2001, largely with the help of international development organizations. Nearly all countries in Africa are rapidly increasing the adoption and utilization rates of computers and the Internet. Senegal, Ghana,

Uganda, Cameroon, Kenya, Tanzania, Malawi, Zambia, Botswana, Gabon, and Zimbabwe, among others, all contain populations with growing dependence on the Internet and pose great potential – and even several recent successes – in using elearning for agricultural extension. Examples include Trees for the Future Inc.'s video agro forestry training in Senegal, and the Danish Agricultural Advisory Service's efforts to build a support service linking farmers in Tanzania, Uganda, and Kenya with advisors via e-mail and Internet (Zachmann, n.d.).

Another project made possible through the collaboration of the Commonwealth of Learning (COL), the University of Zambia, and other groups implemented a distance learning program from 2001 to 2003 that focused on the extension of soybean and cowpea production techniques. After training extension agents from Tanzania, Uganda, Zambia, and Namibia in extension, production, and use of distance learning materials, this project supported the extension of this knowledge to rural farming communities. The results of this project were that distance education programs are ready to be fully implemented. Local informational infrastructures, access to the Internet, and overall reliability and feasibility of elearning in these countries have reached the point where larger programs should be initiated.

Extension agents can also participate across country borders. Nigeria, for example, despite the fact that the country has not yet reached the threshold of connectivity due to such factors as fundamental problems with infrastructure, the lack of stable sources of electricity, and the overbearing cost of Internet through service providers, does have plenty of trained and willing extension agents capable of joining distance learning programs based in neighboring countries (Adomi 2005). Botswana also has a quickly growing Internet population in major cities. This is primarily students and businessmen, who are accessing Internet resources at a growing rate. Still, the agricultural sector could significantly benefit from the distribution of improved agricultural methods. Studies show that twenty-one percent of cybercafé users in Botswana's capital, Gaborone, are already involved in some aspect of elearning (Mutula & Sairosse, 2004).

CONCLUSIONS

The first steps of elearning in agriculture are being taken in just about every country. The United States, Europe, and Australia are leading the adoption of elearning in agriculture, and they are also greatly assisting developing countries to do the same. While much of the available funding and interest has been geared toward specialized programs in agribusiness, agro-terrorism, and agricultural management, a large number of organizations have been producing agricultural elearning training of varying quality. The challenge is to fully exploit electronic media, maximizing its usefulness and the realm of possible resources; elearning must not be Power Point presentations modified into online modules, but rather well-designed training that draw on the best electronic resources available. The recent online programs developed and made available by the FAO and a few other organizations are instilling smaller organizations, which could otherwise not afford the time or money to develop them, with high-quality elearning training resources. An effect similar to the cell phone epidemic that swept across most of the developing world is helping to promote elearning. Many communities are skipping traditional training delivery methods and are going straight to using elearning. Extension agents will continue to play a critical role in agricultural extension, bridging the gap between elearning methods and implementation in the field.

REFERENCES

AAC (Agriculture and Agrifood Canada). (2003, August 29). An overview of elearning in Canadian agriculture and agri-business. Retrieved February 17, 2006 from http://www.agr.gc.ca/ren/pdf/elearn_e.pdf.

Adomi, E. E. (2005) Internet development and connectivity in Nigeria. Department of Library and Information Science, Delta State University, Abraka, Nigeria; 39 (3), p257-268.

EDP Weekly's IT Monitor, (2003, July 28). CSC awarded Department of Agriculture contract CSC to provide program management, knowledge management and elearning support services. v44 i29 p8.

Edwards, W.M. & Eggers, T.R. (2004, August). Agricultural management e-school; extension education over the internet. *American Journal of Agricultural Economics*, 86, p.778.

Emergency Preparedness News. (2005, July 19). Agro-terror awareness. 29 (14), p109.

Fritz, S.M.; King, A.W.; Moody, L.B, Schauer, J. & Rockwell, S. K. (2002, December 11). Analysis of distance education research. Presented at the 29th National Agricultural Research Meetings (1992-2001). Las Vegas, Nevada, USA. Retrieved February 17, 2006 from http://aaae.okstate.edu/proceedings/2002/NAERC/Analysis%20DE%20Moody-Schauer-Fritz-King-Rockwell.pdf.

Grenier, A. (n.d.) Developing web-based distance learning courses in agriculture for the Caribbean. Retrieved February 17, 2006 from .

Jamias, S.B., Quizon, J.B., & Rola, A,C. (2002, Spring). Do farmer field school graduates retain and share what they learn? An investigation in Iloilo, Philippines. *Journal of International Agricultural and Extension Education*. 9,(1). p.65-76.

Kirkland, E. (2002, September 23), More students seeing opportunities in agriculture. *Mississippi Business Journal*. 24, p.20-22.

Lippert, R.M. & Plank, C.O. (1999). Response to a first time use of internet in-service training by agricultural extension agents. *The Journal of Natural Resource and Life Science Education.* 28,. p.53-56.

Mahmood, K. (2005). Multipurpose community tele centers for rural development in Pakistan. *The Electronic Library*, Emerald Group Publishing Limited. 23 (2). p.204-220.

Murphy, T.H. & Terry, H. R., Jr. (1998). Opportunities and obstacles for distance education in agricultural education. *Journal of Agricultural Education* 39(1), p.28-36.

Mutula, S. H. & Sairosse, T. M. (2004). *Use of Cybercafés: Study of Gaborone City, Botswana*. Electronic Library. Emerald Group Publishing Limited. Vol. 38, No. 1 p. 60-66.

Parton, K. A. (2001). *Agribusiness Education and the impact of the Internet: The growing ripple in the pond*. Retrieved October 2005 from http://www.ifama.org/conferences/2001Conference/Papers/Area%20I/Parton_Kevin.pdf.

Raulerson, R., Ricky, T., Tracy, I., Place, N., Lundy, L., Swain, C., Dooley, K., Lindner, J., Anderson, E., Moore, L., Carter, R., Schmidt, A., Akers, C., Davis, C., & Bielema, C.

(2004). Promoting excellence in the instructional design of distance education programs. Proceedings of the 20th Association for International Agricultural and Extension Education (AIAEE) Annual Conference. Dublin, Ireland. p.1005-1006. Retrieved February 17, 2006 from http://www.aiaee.org/2004/Posters/raulerson-lindner-poster-NEW.pdf.

Reid, J.F.(2001, September). From lab to farm. *Engineering & Technology for a Sustainable World*, v8 i9 p33.

Wachenheim, C.J. (2004, December). How an online course compares to its classroom counterpart: A preliminary investigation. *North American Colleges and Teachers of Agriculture (NACTA) Journal*. Retrieved June 2, 2006 from http://www.findarticles.com/p/articles/mi_qa4062/is_200412/ai_n9472465.

Zachmann, R., Chikoye, M., Siaciwena, R., and Alluri. (n.d.). Developments of distance learning programmes for agricultural education in southern Africa. Retrieved on June 2, 2006 from http://www.col.org/pcf3/Papers/PDFs/Zachmann_Chikoye_Siaciwena_Alluri.pdf.

International Journal of Education and Development using Information and Communication Technology (IJEDICT), 2006, Vol. 2, Issue 2, pp. 60-68.

Community radio and emerging information networks[1]

Ruchika Negi
Social Science Researcher, New Delhi, India

ABSTRACT

This article seeks to take a closer look at the workings of five community radio groups operating in the northwestern hills of Uttaranchal in India. Why is there a need for alternative knowledge platforms? What does it mean to work on information networks? Who are these people who comprise these groups? The article tries to introduce and analyse the processes and the experiences of the local volunteers in doing radio amidst their own community members. The article suggests that such initiatives, small and scattered as they may be, help in the creation of knowledge networks that help to form newer, hitherto unexplored spaces of dialogue and discourse.

Keywords: *India; Uttaranchal; community radio; knowledge networks; ethnographic action research.*

INTRODUCTION

A small village, Aampata in the Tehri Garhwal District of Uttaranchal, is abuzz with activity on an unusually animated Sunday afternoon. People of all age groups, big and small, some eager faced, others gripped with lassitude on a warm summer afternoon, are huddled in the community hall. They are staring at a VCD projection in front of them, their hands folded in abeyance, at a bearded saffron clad "baba", a new age "guru", on the screen.

The religious sermon of the hirsute ascetic sounds like a peculiar, monotonous buzzing of lazy flies in that trapped room. Yet, the pious audience, half of whom are dozing off, having sacrificed their siestas for a religious cause, tightly clasp their hands together and bow their heads, making the onlooker suspect that they just may have fallen asleep after all!

In the Panchayat room, next to this spiritual ambience, a team of young, restless people with radio sets and tapes in hand are sitting and performing "check tests" on their microphones. Their eyes are affixed on the tiny wooden door, eagerly expecting the religious gathering to break anytime and for their first audience to pour in. These young people are community radio volunteers from the neighboring villages and are a part of Hevalvani Samudayik Radio (Hevalvani Community Radio). They have come to this village today in order to play back some programs that they had recorded here, a couple of months earlier.

Needless to say, they are keen to hold a listening and feedback session with their audiences. They are also hoping, if they get lucky, to initiate some new interesting debates and discussions among their listeners. Everyone in the team is a bit baffled at this unexpected competition from a VCD run religious lecture. "I always thought that television serials and soap operas are the main competitor to our community radio. But now we have to live with this also," says a volunteer, irritated and impatient at the wait.
(Action researcher's notes based on a discussion with community radio volunteers.)

This is a story of a convergence of spaces that bring people together and of mediums both tangible and intangible that have played a subtle yet crucial role in connecting people, often sociologically termed as “communities”. Who is this group of religious devotees and why are they gathered together? Who are these young people and what are they doing in a strange village?

NETWORKS OF EXCHANGE

Over the centuries, just as in an urban scenario, as mobility has increased and information goods have made the knowledge exchange rapid and fast, some public spaces have shrunk and, unwittingly some new meeting grounds have emerged. One observes this in the case of the mountain communities of Uttaranchal too, even though the media onslaught is obviously not on the scale of its contemporary urban counterpart. Yet, new media forms such as television, telephones, and mobile phones have speeded up the communication flow to an extent. They have also created small, private, individuated spaces that take away the experience of a collective sharing from the community consciousness that was there earlier.

Migration from these hill communities to neighboring urban centres is great, and hence the need of the time is to create new collectives that can be grounding yet free flowing with the flux. Old meeting spaces such as village melas (fairs), village pooja (worship) ceremonies, etc are fast shrinking. The two instances cited above are small attempts at creating new spaces of convergence, mediated by factors that may not be defined as “cultural”, yet may be responsible for the creation of a new culture of information network societies.

> *“Networks constitute the new social morphology of our societies, and the diffusion of networking logic substantially modifies the operation and outcomes in the processes of production, experience, power and culture” (Castells 1996).*

This article is an attempt at documenting the complex processes of one such small effort at evolving an “information network society” among the hill communities of Uttaranchal by voluntary Community Radio groups operational in five diverse regions of Garhwal and Kumaon. The ethnographic action research was done over the period of pone year in 2004 when the radio groups started receiving support from UNESCO.

A SHARED PLATFORM: COMMUNITY RADIO IN UTTARANCHAL

In 2000, five community radio groups emerged in Uttaranchal, a newly formed hill state located in the northwestern hills of India. Himalaya Trust a local, non-government organisation based in the capital, Dehradun, provided assistance in giving basic equipment and technical training to these eager volunteers.

Hevalvani Community Radio is located in the Heval river valley of Tehri Garhwal district. Situated at a distance of about 40 kilometers from the nearest city centre, Rishikesh, the group is comprised of 6 young active members from around the kasba (township) of Khadi.

Raibar Community Radio, its neighbor, operates from the Balganga river valley in Tehri Garhwal. This group is a mixture of young and old, one of its co-founder members being a 60-year-old animated lady who is also involved in other welfare and social activities in her village. Interestingly, the group operates from two distinct areas, one being the town centre of Chamyala and the other, an isolated village with no road access, situated atop a mountain ridge, Bangaon.

The peculiar location of the radio group makes it possible for the members to collect information from the well connected, burgeoning township of Chamyala and disseminate it. It is done with the help of their radio, amidst the villages that are far flung and in the vicinity of Bangaon, which is about an hour's climb through the forest and mud tracks from Chamyala.

Shristhi Community Radio has its roots in Uttarkashi, which also lies in the Garhwal region. Comparatively a younger group as opposed to the others, it is struggling to expand its voluntary support base, and the members are keen to involve the students of the Garhwal University that is located in Uttarkashi.

Mandakini ki Awaz Community Radio is located in the Mandakini river valley, Pauri Garhwal. The members work from a small village, Bhanaj, about a 5-hour drive from the nearest town centre of Rudraprayag. This group aims at creating an open and transparent administrative and governance information system. The radio group mediates between the people and the governing bodies (panchayats) in these villages, in order to create an open platform where policies, schemes and financial budgets can be made available for public discussion and scrutiny.

Pradeep Community Radio is located in Kausani in Kumaon district. Young and vivacious members of this group operate from Kausani, a small hill station near Nainital, and Garud, a neighbouring township. The group strives to work on not only community issues and concerns but through its radio programming focuses on collecting and documenting the oral history andtraditions of the valley, for posterity,

Members who form these active radio clubs come from all walks of life, the one binding thread being their love for the medium and a desire to work towards a community owned and operated media and knowledge form.

> *"Why is it that some voices can never be heard? Why is it that people from my area are not being able to access important and timely information? Topographically, whether we like it or not, our communities remain very distant even from each other, let alone the other areas of the world. The youth in my village are never able to get any employment, education related news on time! Or if they do, they are unable to share it with others. Gradually, our community creative forms of entertainment and exchange are also disappearing. That is why I think community radio is that one medium that enables me to work on information network and needs of my community while at the same time, it gives me and others, an opportunity to interact with each other, personally," says Vipin Joshi, a young enthusiast from Pradeep Community Radio.*
>
> *"For me working in community radio means sharing my experiences with others and learning from their ideas and thought processes. It is almost as if all of us are working towards not only preserving but also building a new heritage (viraasat) for our coming generations", feels Archana Raturi, co-founder and an active member of Hevalvani Community Radio.*
> *(Action researcher's notes based on discussions with community radio volunteers)*

THE VARIOUS ROLES OF COMMUNITY RADIO

Facilitating Dialogue

"Community" is a fluid term, even though it attaches a certain degree of cultural, spatial, traditional peculiarity to its "people", its meaning may nonetheless be fast changing too. Given the distinctions and similarities of such a social complex, what motivates a group of young people to do work within their own communities and why?

> *Children from a village at a narrowcasting-cum-recording session*
>
> *Shri Bhagwati Prasad is an old, retired, well-respected teacher of his village. He is considered to be a hardworking and a foresighted man and many come to him to seek advice on diverse topics ranging from marriage to farming techniques.*
>
> *Bhagwati Prasad has grown up studying the changing cycle of seasons and its effect on his mountain soil since he was a child. That is why he seems to think that a very good source of supplementary farm income in his village could be had if everyone in his village and around him would start growing certain varieties of fruits in specific seasons. But initially everyone around him thought that the old man had grown senile. One cannot and does not practice horticulture without government aid. What if the fruits did not sprout? And if they did, who would buy them?*
>
> *But the old man did not give up. He planted 18 walnut trees around his house and then some oranges. Gradually he started a fruit nursery in the village. "I have very simple reasons for doing what I do," he shares. "One, that when I die, these people will have something to remember me by. These trees will be my gift to them. Two, as you must have noticed, people in this area are very poor. When some guests come to visit or whenever any of us has to visit our daughters-in-laws, instead of spending money on sweets, we can now take them home grown, healthy fruits. And I distribute the saplings to everyone in the village, so that people do not steal any of my fruits. Sharing kills the temptation to do evil", his toothless face and twinkling eyes are an inspiration enough for everyone now in that village to help him with the fruit nursery."*
>
> *But no one except people from his village and the neighboring areas know that one of their own people is experimenting with a new idea. They go on thinking that horticulture is impossible and useless without any outside aid.*
>
> *One member of Hevalvani community radio happened to be visiting the village and heard of this industrious old man. Out came the recorder and the story was captured. The radio group has been playing this program in many villages since then and many curious listeners have shown eager interest in the initiative.*
>
> *Through the medium of their community radio, there remain many more stories to be told, to be discovered perhaps, circulate and shared.*
> *(Volunteer's field notes)*

The knowledge platform that community radio groups in Uttaranchal are striving towards could become one such space where stories from different regions and across ages can travel and inspire others. Creating shared networks also signifies a movement, all-encompassing of the various sections in the social structure of the society.

Mediating Change

These animated community workers are ambitious yet realistic about their endeavors. They realize that not only is it becoming increasingly challenging to rephrase the term "community" to specific, particular contexts, the fractured nature of the social fabric that they have lived and worked within is also an important consideration.

Societies and communities within them form groups on the grounds of dissension and distinction. Issues of caste, class, and gender define not just the personal identity of an individual, they also form the "sociality" around an individual identity- the age defined collective and cultural identity of the communities they are born within and are a part of. It is through social normative practices and beliefs around gender/caste/community rituals etc that individuals learn to identify and define their personal and social roles within their societies as well. And if one is working towards creation of a free and fair network of knowledge, it becomes important to address and work with the barriers that emerge from the cultural and everyday practices in one's immediate social environment. Community radio, in this context, is not just limited then, to an information exchange medium, it also becomes a crucial public advocacy tool in one's community.

> *This is a love story, but it is difficult to say whether it is a happy or a tragic one. Well at least it is simple….and predictable. In Baijnath, a village near Kausani in Kumaon, different caste people live together and mingle daily in work and in leisure with each other. And then one day a high caste Brahmin boy decided to go and fall in love with a low caste, harijan girl…and thus destroyed the illusion of equality that everyone blissfully lived under.*
>
> *The couple revolted against all odds and got married amidst a roaring public storm. But there seems to be no happy endings here, for the boy's family, once considered to be a very respectable one in the village, has now been socially exterminated from the rest of the community. Others consider speaking or interacting with this family a "sin" and any one, who breaks the line, is punished in a similar fashion.*
>
> *This is an old story, relived many times over. Members of Pradeep CR decided to retell it in a different style this time around, by holding public meetings among the youth of the area and asking them what they thought about the whole affair and would they be willing to take a bold stand and revolt against such blatant and unjustified discrimination? People spoke as they often do at public forums, but a few were stirred. A few wanted to do something, if only make a radio program on this issue and gather wider public opinion about it by circulating the program in various colleges in the neighboring areas.*
>
> *It is difficult to bring a 'revolution' and all of us work within our social constraints, and yet someone did speak. And many were heard and many others remained tacit, waiting for their "right moments". But it was a beginning of a dialogue and that in itself is important. The debate may not have eventuated anything, but was pregnant with the possibility of it….and that is important.*
> *(Volunteer's field notes)*

Towards the Creation of Knowledge Societies

In such a knowledge set up as the community radio activists in Uttaranchal are working towards, the user of information also becomes the provider of content, individually or in co-operation with others. People "choose" to come together on a shared platform, motivated and excited by diverse and conflicting ideas and thoughts. Such a process involves the formation of new communities, of new parameters that define the "peculiarity" that hold people together.

Raibar Samudayik Radio (Raibar Community Radio) held a narrow-casting session in the village of Chillialgaon. A huge, inquisitive gathering of young and old gathered to witness this gang of radio communicators with their big stereo system, amplifiers and microphones and waited impatiently for the "show" to begin.

> *"What is this box that you are carrying", inquired an old lady to a girl volunteer with suspicion. "This is a stereo. We have come to play back a program that we recorded with Shri Bajram Kukreti ji last year. Would you like to listen to it?" the volunteer replied bemused at the old woman's curiosity. The old lady's eyes dilated in disbelief. Bajram ji, a much respected, retired old school teacher of this village had recently passed away and she could not believe that the dead could speak again. Was this a magic show? She hunched on her knees and squatted near the "black box", her eyes fixed for the magic to begin any time now!*
>
> *Children and youth gathered shyly around the instruments, scared to touch the gadgets but brimming with excitement to touch them and see what would happen! The narrowcasting began and everyone, enraptured, heard the story and experiences of their beloved Bajram ji whom they had so recently lost to fate. The men bowed their head in reverence and the women heard it in awe!*
>
> *After the program, the radio group decided to make another program with their listening audiences right then and there and thus out came the recorder and microphones. Since the women members usually are too shy and apprehensive to speak on public platforms, the group focused their attention on talking to some and making them comfortable with the gadgets, telling them how they work and what they can do, encouraging them to play with these technological devices themselves. This not only invited an attentive response but also put them at ease and soon some of them were singing their forest songs into the microphones and requesting the volunteers to play it back so that they could hear their voices and that of their friends.*
>
> *A peel of laughter would ensue each time a familiar voice boomed from the speaker! They stared at the cassette player as if it was some kind of a magic box that had miraculously captured a part of them forever. They squealed with surprise and glee as they heard each other's voices and seemed almost convinced that this was some form of 'black magic'!*
>
> *Some looked proud at having been able to provide useful content that made the others grow silent and listen with attention. At the end of the recording session, most of them who had been extremely inhibited to speak in the presence of their community elders and men seemed to have shed all their apprehensions and were truly enjoying this new experience which made them feel free and confident.*
> *(Volunteer's field notes)*

RESEARCHING CONTENT FOR EFFECTIVE PROGRAMMING: WAYS OF DOING COMMUNITY RADIO

An important element of the support provided by UNESCO to the CR groups was the introduction of research practice into radio programming. Any knowledge sharing paradigm has to premise itself on the understanding of the existing information patterns in a community that it attempts to work with. The research ought to acknowledge and identify the inherent social and cultural knowledge gaps and obstructions. Gender discriminations, caste divides, the distinctions between rich and poor in a village society (as in the case of an urban scenario as well) impacts the way information is accessed and utilized.

The ethnographic action research, supported by UNESCO, helped the radio groups in rethinking their program strategy to make it more directed and focused in addressing the tacit needs of communities.

Reflection of a CR field researcher

> *"When I set out to do research into the kind of radio programming we ought to be doing in order to make for an effective community media platform, I had many questions in my head. I feel that we live in an age of extreme poverty and I do not mean it in the sense of a financial lack. There are various forms of poverty- people have stopped thinking about what they do, our lives are dictated through social stereotypes and somewhere we do not feel the need to reflect on our actions any more. I think that the most pervasive form of poverty that has gripped our hill society today is social and cultural in nature. It is for these reasons that I decided to work with the youth in my village, through radio. This research is a way of increasing the scope of our radio not just in terms of making more community based programs, but in exciting new thoughts and ideas in people's minds."*
> *(Field Researcher's Notes- Pradeep Community Radio, Kumaon)*

Three radio groups undertook an information mapping exercise in 4 village communities in Garhwal and Kumaon (see Table 1).

Table 1: *An information mapping exercise in 4 village communities*

Site No.	Research Site	Researchers per Site
1	Jardhar village, Tehri Garhwal	1
2	Bangaon village, Tehri Garhwal	1
3	Chaani village, Kausani, Kumaon	1
4	Baijnath village, Garud, Kumaon	1

Through this exercise, the researchers were able to identify some problem areas in the existing information patterns and were also able to focus on the subsections within the community who have restricted access to certain knowledge forms.

Marginal Voices

> *During the research, I realized the significance of informal and formal networks of information that exist in the village. Some people read posters/hoardings, listen to radio or watch television, others sit in a tea shop and discuss newspaper reports while the women (those who are illiterate) may have other fluid channels for discussing topical/pertinent issues like conversations with each other while working in the fields or while going in groups to the forest to fetch wood etc. The real issue is that of "accessibility" in terms of the kind and nature information that is readily available to some in the community while it remains distant and unapproachable to the others.*

> *In Chaani, I worked with the women to find out how they understand and use the information that they get through television, radio, informal exchanges etc. I found that these women were frustrated at being mere passive receivers of information. They had critical concerns and were seeking a platform to voice their needs. The mindless depletion of natural resources, deforestation and environmental degradation were issues that touched their lives intimately. The women are the ones, in our hills, who fetch fodder, work in the fields, take care of livestock and hence issues of biodiversity are close to their lived reality. Yet they are hesitant to voice their concerns publicly in a big forum. Their diffidence does not come from lack of knowledge, but because of the way their roles as women, in their family, village, community at large are perceived and framed. Some of the older women are "illiterate" and hence feel that the traditional/experiential knowledge that they possess is irrelevant in today's contexts. Through a simple process of community radio- recording their voices, making programs on small environmental initiatives undertaken by them in their village forests and narrowcasting it in a weekly village meeting, gave them much needed corroboration and legitimacy to speak and be heard by others in their community.*
> *(Field Researcher's Notes- Pradeep Community Radio)*

The research pushed the radio volunteers to extend the scope of their work by challenging their own thought processes and personal prejudices as well.

Critical Questioning

> *Through this research, I worked with the harijan (low caste) community in my own village, Jardhar. It was a personal journey for me in the sense that even though I have lived and grown up in this village, I never so much as gave a thought to this particular subsection in my community, even when I sought out to do community radio initially. I was very hesitant in the beginning in how to approach them - how could I, a high caste Rajput, work with these people? Even though caste discriminations are not as apparent as they used to be a decade ago, the inherent distinctions emerging from community practices, persist even today. But personal, intimate conversations and interviews with the group made be comfortable with my initial doubts and fuelled my curiosity to probe deeper to see where the roots of this discrimination lie today. I feel that economic poverty is one of the many reasons that account for the backwardness of the low caste hill community in our villages. Much of governmental intervention and aid is directed for the benefit of low caste communities and yet there are a host of issues that hamper their growth. Lack of education, limited accessibility and lack of transparency/accountability in government schemes, social perceptions and caste constructs of "how harijans are supposed to be"- all these are important pointers through which we must address caste issues in today's contexts. I feel that our radio could become a crucial tool to facilitate a dialogue between different subsections within the community. Our radio must provide a dynamic platform, representative of the diversity of voices that exist within our community. As a small beginning, Hevalvani (the radio group) must be able to throw up existing realities and evoke critical community discussions across a cross-section of people.*
> *(Field Researcher's Notes- Hevalvani Community Radio- Garhwal)*

CONCLUDING OBSERVATIONS

It is interesting to note how so many new communities have emerged, infantile but nonetheless eager to evolve and grow. There is a community of radio activists, who come from different spheres of life, carry diverse and disparate experiences and are keen to exchange and barter their learnings for that of the others.

There is a subsection of the existing social structure that is able to find a voice through the community of radio activists and, for the first time maybe, is making an attempt at being heard. There are those who have sat up and are showing a willingness to not just articulate their own thoughts but also to listen to what a host of others have to say.

Social groups that have been considered as "outsiders" to the community sphere for a long time, NGOs, researchers, community media activists, now have an entry point to engage with and be a part of the collective experiences and processes. And in this network of 'new communities' a reservoir of hidden, lost, unpreserved knowledge forms is surfacing, a new language is being discovered that could be spoken and understood by everyone.

Endnote:

[1] The article is based on findings from research undertaken among community radio groups in a network of ICT initiatives with support from UNESCO. The author is responsible for the choice and the presentation of the facts contained in the article and for the opinions expressed therein, which are not necessarily those of UNESCO and do not commit the Organisation.

REFERENCES

Castells, M. (1996). *The Rise of Network Societies: The Information Age, Vol. 1*, Blackwell Publishers.

International Journal of Education and Development using Information and Communication Technology (IJEDICT), 2006, Vol. 2, Issue 2, pp. 69-81.

Exploring Turkish science education faculties' understanding of educational technology and use

Hakan Turkmen
Ege University, Turkey

ABSTRACT

This paper reports the results of a survey that determined science education faculty members' attitude toward computer use. The purpose of this study is to the address the understanding of educational technology faced by science education faculty members in Turkey. Two educational perspective themes concerning the knowledge of science education teachers converge in this study: science education faculty members' current knowledge and desired knowledge of understanding of educational technologies and use. The questions were "What are Turkish science education faculty members' current perceptions on using technological tools in science courses?" and "What do Turkish science education faculty members want to know on using technological tools in science courses?" The findings of this study showed that Turkish science education faculty members are relatively unfamiliar with the advantages of educational technology and do not maximize its use, but they want to know the advantages of educational technology.

Keywords: *technology knowledge; science education; classrooms applications of technology; Turkish education.*

INTRODUCTION

Technology is essential to science for such purposes as access to outer space and other remote locations, sample collection and treatment, measurement, data collection and storage, computation, and communication of information. There are many good examples of using of technology resources to enhance learning in science classrooms. There is no doubt that rapid increase in technological resources is going to have a revolutionary effect on teaching of science (Windelspecht, 2001) and prepare students for life in the real world (Bailey, Ross, & Griffin, 1996; Petrakis, 1996; Stanley, Linauer, & Petrie, 1998). Technology has indeed transformed our lives drastically. Just to give an example, we can now easily communicate with anybody on earth via e-mail. We can also access all kinds of information on the Internet. However, using technology in the science classrooms is not common in Turkish schools yet.

People today think that computer represents the only educational technology available these days, which, of course, is not true since there are many different kinds of technology in the classroom such as the overhead projector, slide and slide shows, documentary video, computer. Briefly, all kinds of tools which teacher are able to use in the classroom to enhance learning are considered technology. With the overhead projector, you can show diagrams, charts, or figures that clearly indicate analysis of the topic, pictures. This device has now become a traditional use of technology in the classroom.

Turkey has made major efforts to integrate educational technology in Turkish education system. The Minister of National education has helped and to controlled effective use of the technology in education institutions of all level and types. The government has sought assistance to introduce a number of projects aimed at improving the quality of education. These projects include up-grading the curricula and instructional materials, revising student achievement test, improving the teacher

training system, and increasing the research component in education (Hizal, 1991; Turkmen & Pedersen, 2005; Yedekcioglu, 1996). Today, many schools are using technology successfully in teaching in Turkey. Although technology integration started after revolutıon of Turkish education system by asisting Dewey in 1920's, electronic technology was not integrated until the introduction of the television in the 1970's. Starting in the mid 1970's, network television broadcast Turkey's first educational television project that was developed at the Eskisehir Academy of Economic and Commercial Sciences. This small project showed that the technology could be used for instruction in an educational setting (McIsaac, Murphy, & Demiray, 1988). But the reason of policits and economics Turkey could not use television efficiently. In 1984, the Ministery of National Education organized 48 training programs, called "Computer Aided Education (CAE)," on technology integration and many teachers were trained in computer literacy and programming with the aim of training more teachers (Yedekcioglu, 1996). In the 1990's, educational uses of the internet in Turkey were in their infancy period. In 1993, Computer Experimental Schools (CES) project has demonstrated that information technology is a powerful tool in the teaching-learning process (Akkoyunlu & Orhan, 2001). In 1998, supporting of the Word bank, the Turkish Government started "Increasing the Quality of Basic Education Basic Education Program". As part of this effort, information technology classrooms were built in at least 2 primary education schools in 80 cities. Following the World Bank agreement in 1998, "Project for Globalization in Education 2000" was important step for the Turkish Educational System. The project was to follow the developments of the "Information Age" and use instructional technology at each level of the education system to enable to Turkish society to use information and technology. In 2004, the K-8 curriculum was completely changed. The goal is to for teachers to be on the cutting edge and provide a student-centered curriculum which will focus both on as well as deeper learning and understanding (Constructivist perspectives). The new curriculum will provide eight common skills that students previously lacked: Critical thinking, problem solving, scientific research, and creative thinking, entrepreneurship, communication, and using information technologies (Turkmen & Pedersen, 2005). Even, the name of the "science education" course was swiched the "science education and technology."

The study was designed to explore Turkish science education faculty members' understanding of educational technology and in light of Turkish science education faculty members' opinions to discuss what Turkish schools need to focus on to integrate educational technology. In the process I will show major themes and results revealed by the data gathered in my survey. Specifically, I am posing the following research question:

1. What are Turkish science education faculty members' current perceptions on using technological tools in science courses?
2. What do Turkish science education faculty members want to know on using technological tools in science courses?

PURPOSE

The purpose of this study is to examine Turkish science education faculty members' attitudes towards the use of technological tools in their science lessons in Turkish colleges of education. The "Faculty Technology Survey: Technology Usage and Needs of Science Educators" examined the differences between current and desired levels of knowledge about using technology as (a) "General knowledge about educational technology," (b) "Ways in which computers can be used to," (c) "How to use a computer in science for," (d) "Effects of computer use on," and (e) "How to use other technology in the classroom."

INSTRUMENTATION

This study was a cross-sectional quantitative questionnaire. The "Technology Usage and Needs of Science Educators" survey was divided into 3 sections; a) Section A has 9 demographic questions; b) Section B, "General knowledge about educational technology," had 14 questions; and c) Section C had of four categories- "Ways in which computers can be used to" with 8 items, "How to use a computer in science for" with 23 items, "Effects of computer use on" with 5 items, and "How to use other technology in the classroom" with 11 items. Each category of section C was answered in two different levels, which are "Current Knowledge" and "Desired Knowledge" (See Figure 1)

This questionnaire was made of two different surveys, "Metiri Group Faculty Technology Survey" (Metiri Group, 2001) for Sections A and B, and Pedersen and Yerrick's survey, "Technology in science teacher education: Survey of current uses and desired knowledge among science educators" for Section C (Pedersen & Yerrick, 2000). The result of analysis showed that the reliability of section B was 0.828, section C was 0.902 (Category C1: 0.807, Category C2: 0.887, Category C3: 0.846, Category C4: 0.866).

The survey used a 5-point Lickert-Scale. A value of 1 represented "does not apply," 2 "strongly disagree," 3 "disagree," 4 "agree," 5 "strongly agree" in section B. For section C, a value of 1 represented very low level of knowledge, while 5 represented a very high level of knowledge, as an "Anonymous/Confidential Survey," no personal information included on the survey.

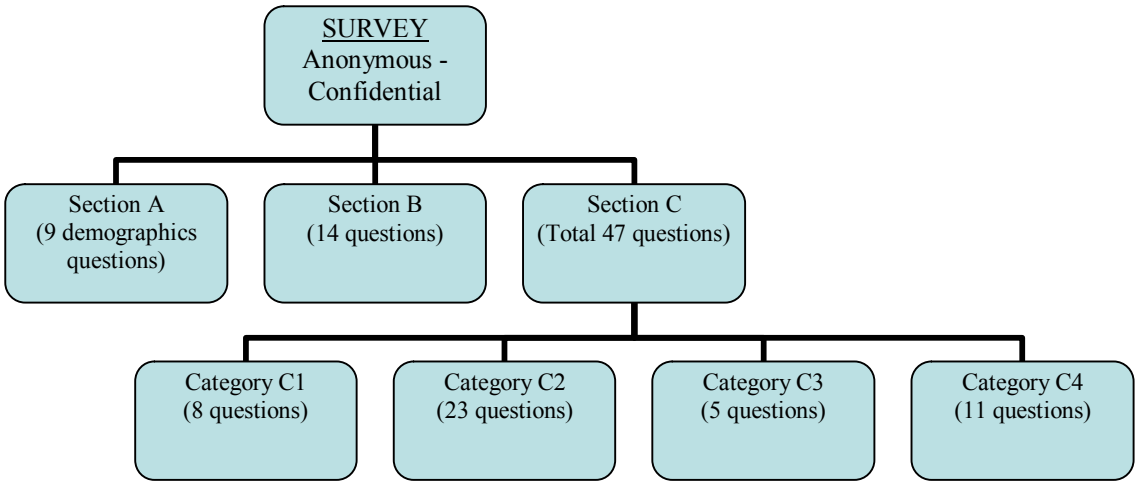

Figure 1: *Instruments of study*

DATA COLLECTION PROCEDURE

There are currently 34 science education departments or programs in colleges of education in Turkish universities. Since I could not reach the entire population; I divided the population into seven segments based on the seven geographic regions in Turkey. Before conducting the research, a letter and e-mail was sent to the colleges of education deans and science education faculty members for their permission. The letter explained the purpose and importance of this

research. I sent one to five letters to universities in each region. However, each region does not have same number of universities. I randomly selected five universities by writing each university's name on a piece of paper, putting those names in a cup, and then drawing five names. Thus, I sent permission letters to a total of 27 Turkish universities.

The data was collected by using two paper-and-pencil questionnaires. Turkish science education faculty members were asked to fill out the questionnaire in their personal time. Participants completed the survey in 20-25 minutes.

DATA ANALYSES AND RESULTS

A total of 62 science education faculty members from 20 different Turkish universities were surveyed face-to-face and online in this study. One-way ANOVA test with selecting 0.05 α were used to determine whether the sample means were statistically different. The magnitude of the mean differences was also examined. The mean differences were categorized as small (<0.00-0.50), medium (0.51-1.16), or large (>1.17) to assist in making sense of the differences between current and desired levels for each item. Overall, 62.9 % of the surveyed faculty members were male, while a smaller number 37.1%, were female (Table 1).

Table 1: *Gender Differences between Turkish Science Education Faculties who participated in the survey.*

	# Male	**% Male**	**# Female**	**% Female**	**# Total**	**% Total**
Turkish Faculty (by e-mail)	10	16.1	1	1.6	11	17.7
Turkish Faculty (by face to face)	29	46.8	22	35.5	51	82.3
Total Faculty	39	62.9	23	37.1	62	100

This study showed that most of the Turkish science education faculty members supposed they are called themselves in intermediate (46.8%) and/or in advanced (46.8%) level technology user (See Table 2). The rank of faculty may play an important role regarding technology usage in preparing science teachers. Although most of the faculty members (Teaching assistant, Instructor, Assistant professor) do not have enough experience as educators, because they are in beginning of their carriers, they have taken technology courses, and have had proficiency in the English language in order to earn their Ph.D. (See Table 3). This provides opportunities to read and understand current research and new approaches that utilize technology for education. It would seem that assistant professors have an advantage over instructors and are able to gain a broader understanding of technology through their program of study and subsequent reading and study.

Table 2: *Skill and Gender for Faculty Counterparts*

Skill	**Male # - %**	**Female # - %**	**Total # - %**
Non-user	-	-	-
Novice	2 – 5.2	-	2 – 3.2
Intermediate	18 – 46.1	11 – 47.8	29 – 46.8
Advanced	18 – 46.1	11 – 47.8	29 – 46.8
Expert	1 – 2.6	1 – 5.4	2 – 3.2
Total	39	23	62

Table 3: *Rank and Gender Differences for Faculty Counterparts*

Male # - %	**Female # - %**	**Total # - %**
7 - 11.3	12 - 19.3	19 - 30.6
9 - 14.5	1 - 1.6	10 - 16.1
19 - 30.7	6 - 9.6	25 - 40.3
2 - 3.2	2 - 3.2	4 - 6.5
2 - 3.2	2 - 3.2	4 - 6.5
39 - 62.9	23 - 36.9	62 - 100

There was obviously clear that most of Turkish science education faculty members had not taken enough technology or computer courses. In light of these data, the sample of Turkish science education faculty members had some sort of technology/computer classes at the undergraduate level and attended technology workshop (Table 4).

Table 4: *Technology or Computer Classes Demographic Data*

Level	High School	Undergraduate courses	Master's courses	Doctoral courses	Within the past 5 years	Workshop
#	9	29	14	10	19	33
%	14.5	46.8	22.6	16.1	30.6	53.3

Section B of the questionnaire is related to general information about educational technology and use of technology in science courses. The total mean of Turkish faculty members with degrees from Turkish universities was 3.885. There are a few responds for questions 1, 10, 11, and 14, in the strongly agree or agree level. These responds were related to basic use of technology, such as word processing, power point, email, and ethical/legal implication of technology. Remaining responds were in disagree or strongly disagree level. Interestingly, 6.2% Turkish faculty members with degrees from Turkish universities selected the "does not apply" option for at least one question.

The results showed that Turkish science education faculty members do not have much educational technology knowledge because their mean scores fell between 3.1 and 3.9 (between disagree and agree levels). Thus, they are relatively unfamiliar with the advantages of educational technology and do not maximize its use.

Table 3: *Means for Section B of Questionnaire for Science Education Faculty*

Means for Section B of Questionnaire for Science Education Faculty	**Mean**
14-As appropriate, I address social, ethical and legal implications of technology use with my students.	4.500
10-I regularly use technology to communicate and collaborate with peers (e.g. email, threaded discussion boards, listserv, and chat).	4.436
11-I regularly use technology to increase my own professional productivity (word processing, spreadsheets, end note, PowerPoint, etc.).	4.258
1-When designing my own lessons, I regularly include educational technologies where appropriate.	4.161
9-I have strategies for assessing student products created using technology.	3.919
5-I regularly use technology to enhance learning in my classroom.	3.903
3-I am comfortable planning for class sessions that involve student use of technology during instruction.	3.903
7-I am comfortable teaching with technology and have adequate classroom management strategies for technology-supported learning.	3.855
2-When selecting educational technologies, I refer to, and base my selections on, current research on their effectiveness.	3.807
8-I use technology to assess and analyze student progress e.g. using spreadsheets, grade books, or handheld computers/PDA's to record and manage assessment data.	3.774
12-I have developed my own electronic portfolio.	3.597
6-I have strategies for using technology to individualize instruction and meet the needs of diverse learners.	3.468
13-I have a personal technology plan that guides my own technology-related professional development.	3.419
4-I have strategies for assessing student learning in technology-rich learning environments.	3.387

The following tables provide the current and desired means, mean differences and significance of the one-way ANOVA test. The average mean score of Turkish science education faculty members' was 3.199 in current knowledge level and 4.244 in desired knowledge level. In Table 4, the responses were ranked in descending order by mean differences scores between current versus desired levels of knowledge. The item with the greatest difference for Category C1, "Ways in which computers can be used to," was in question 8, "teach students at distance" (1.839). The lowest mean difference was in question 5, "entertain oneself (games)" (.420). The mean differences were in minimum (<.51) between current and desired levels for only question 5, "entertain oneself (games)," the differences for other questions were in medium or large level. Using the following as a definition of range: 1.000 to 1.999 is "very low," from 2.000 to 2.999 is "low," from 3.000 to 3.999 "medium," 4.000 to 4.999 "high," and 5.000 "advanced" level, the Turkish science education faculty members' current knowledge was in the "medium" range and their desired knowledge level was in the "high" range.

Table 4: *Mean and Standard Deviation for Category C1.*

Questions	C1C		C1D		
	M	SD	M	SD	MD
8) Teach students at a distance.	2.177	1.06	4.016	1.09	1.839
3) Statistical analysis and research.	3.161	.909	4.532	.620	1.371
6) Deliver individual learning (computer aided learning).	3.177	.950	4.436	.692	1.259
7) Design of instructional materials.	3.419	1.033	4.484	.741	1.065
4) Class management (develop syllabi, track grades).	3.694	.841	4.648	.671	.954
1) Composing/writing papers (Word processing).	3.661	.904	4.597	.613	.936
2) Personal record keeping.	3.887	.851	4.581	.588	.694
5) Entertain oneself (games).	2.419	1,124	2.839	1.240	.420

M: Mean, SD: Standard Deviation, MD: Mean Differences, C1C: Current knowledge, C1D: Desired Knowledge.

In Category C2, "How to use a computer in science for," the average mean score of Turkish faculty members for "current knowledge" was 2.951 and 4.237 in desired knowledge level.

The item with the greatest difference for Category C2 was in question 13, "Communication tools (e.g., list-servers, chat, discussion boards)," (2.222) and the lowest mean difference was in question 12, "e-mail" (.597). The mean differences were large (>1.17) between current and desired levels for each item.

The important set of questions addressed using technology, computers and the Internet to enhance teaching and learning. Creating websites and learning advanced web programming, such as Web publishing (e.g., Dream Weaver, Page-Mill, Navigator, Web-CT or other similar programs), other multimedia authoring software (e.g., Author-ware, Hyper-studio, Macromedia), and Video editing software (e.g., iMovie, Adobe Premiere), were of lowest interest to Turkish faculty members. The exception was for "web search techniques" (question 20). The responses in Category C2, "How to use a computer in science for," revealed a need to better understand how computers might be used as scientific research tools, such as library search, gathering and storing data, modeling and demonstrating, analyzing and communicating findings.

Table 5: *Mean and Standard Deviation for Category C2.*

Questions	C1C		C1D		
	M	SD	M	SD	MD
13) Communication tools (e.g., list-servers, chat, discussion boards).	2.000	1.07	4.222	.441	2.222
23) Creation and/or use of streaming media.	1.919	1.11	3.742	1.11	1.823
16) Web publishing (e.g., Dream Weaver, Page-Mill, Navigator, Web-CT or similar).	2.258	1.06	3.936	1.05	1.678
21) Technologies specific to your field (e.g., probe-ware in the sciences, geographic information systems in the social sciences, etc.).	2.548	1.16	4.177	.950	1.629
15) Other multimedia authoring software (e.g., Author-ware, Hyper-studio, Macromedia).	2.323	1.10	3.919	.980	1.596
17) Video editing software (e.g. iMovie, Adobe premiere).	2.371	1.04	3.935	1.04	1.564
22) Data analysis software (e.g., SPSS, SAS, other statistics or analysis software).	2.807	1.19	4.274	.908	1.467
11) Databases (e.g., Access, FileMaker).	2.548	1.21	3.984	1.09	1.436
6) Problem solving.	2.919	.874	4.323	.805	1.404
18) Graphic peripherals (e.g., Scanners, digital cameras).	2.855	1.33	4.226	.948	1.371
4) Graphing.	3.129	1.17	4.419	.667	1.290
5) Computer assisted instruction.	3.161	1.10	4.419	.915	1.258
20) Web search techniques.	2.968	1.27	4.226	.999	1.258
8) Analysis of lab data.	3.000	.958	4.210	.926	1.210
3) Demonstrations and modeling	3.048	1.17	4.258	.829	1.210
19) Web browsers - Basic functionality and efficiency (e.g., Netscape, Internet explorer).	3.081	1.16	4.290	.982	1.209
2) Database storage of lab data	3.161	1.10	4.307	.879	1.146
7) Individualized instruction.	3.355	.843	4.484	.695	1.129
10) Spreadsheets (e.g., Excel).	3.194	1.14	4.290	.930	1.096
9) Science-technology-society issues.	3.355	.889	4.387	.662	1.032
14) PowerPoint, Astound.	3.387	1.25	4.419	.897	1.032
1) Library search services (data collection using peripherals).	3.726	1.04	4.597	.613	.871
12) E-mail.	4.000	1.01	4.597	.586	.597

M: Mean, SD: Standard Deviation, MD: Mean Differences, C1C: Current knowledge, C1D: Desired Knowledge.

The data in Table 6 were based on knowledge about computers' effects on classroom management, presentations and preparing for class all produced large mean differences. The average mean score of Turkish faculty members in current knowledge was 3.458 and the highest mean score for a single question was 3.667 (question 4) and the lowest mean score for a single question was 3.048 (question 1) respectively. Using the previously defined ranges, it is apparent that Turkish faculty members' current knowledge of "effects of computer use on" was in the "medium" range. The average mean was 4.575 in desired knowledge. The item with the greatest difference for Category C3, "Effects of computer use on," was in question 1, "Classroom management" (1.18) and the lowest mean difference was in question 3, "Professional presentations" (.823).

Table 6: *Mean and Standard Deviation for Category C3.*

Questions	C1C		C1D		
	M	SD	M	SD	MD
1) Classroom management.	3.048	.965	4.226	.848	1.18
2) Class preparation.	3.419	1.03	4.387	.732	.968
5) Time management.	3.484	.971	4.419	.821	.935
3) Class presentations.	3.661	.974	4.500	.621	.839
4) Professional presentations.	3.677	1.07	4.500	.763	.823

M: Mean, SD: Standard Deviation, MD: Mean Differences, C1C: Current knowledge, C1D: Desired Knowledge.

The average mean score of Turkish faculty members was 3.098 in current knowledge level and the highest mean score for a single question was 4.097 (question 5) and the lowest mean score for a single question was 2.129 (question 3) respectively. For "desired knowledge," their mean score was over 4.000 which would indicate that they desire to have a higher level of knowledge about "How to use other technology in the classroom".

The item with the greatest difference for "How to use other technology in the classroom" was in question 4, "Hypermedia" (1.548) and the lowest mean difference was in question 5, "Overhead projector" (.019). The results indicated that overhead projector, calculator, and slides were the most used educational tools in Turkish classrooms. Also all faculty members agreed that hypermedia and interactive video are the least used technological tool. Perhaps, this is because this technological tool is rather new and new technologies, like computer, interactive video, hypermedia, and digital camera are not well integrated into the Turkish educational system. The mean differences were in large (>1.17) and in medium (1.16-.51) between current and desired levels for each item, except questions 5, and 8.

Table 7: *Mean and Standard Deviation for Category C4.*

Questions	C1C		C1D		
	M	SD	M	SD	MD
4) Hypermedia.	2.452	1.17	4.000	.868	1.548
3) Interactive video.	2.129	1.09	3.629	1.15	1.500
2) Film.	2.661	1.16	3.887	.907	1.226
10) Digital cameras.	2.871	1.26	4.097	1.13	1.226
1) Video.	2.903	1.18	4.016	.878	1.113
11) Others.	2.710	.965	3.677	1.11	.967
6) Slides.	3.677	1.17	4.258	.991	.581
9) Microscope.	3.403	1.49	3.968	1.38	.565
7) Concrete Manipulative models (Photographs...).	3.581	1.06	4.097	1.05	.516
8) Calculators.	3.597	1.12	4.097	1.11	.500
5) Overhead projector.	4.497	.882	4.516	.718	.019

M: Mean, SD: Standard Deviation, MD: Mean Differences, C1C: Current knowledge, C1D: Desired Knowledge.

CONCLUSION

A survey of the Turkish faculty was undertaken in an effort to establish both current uses of educational technologies and to determine the gaps between current and desired levels of knowledge. The greater gap, the more valuable it would be to profession to address those technologies. It appears that among science education faculty members there were substantial and specific areas for which technology uses were important. It seems that each questions required professional knowledge.

The results of this study showed that the Turkish faculty members have the low mean scores in current knowledge level of educational technology usage and needs of science education, indicating they may not be prepared with skills necessary to succeed in the 21st century. That means, teacher educators do not sufficiently model appropriate use of computers for instructional purposes, either in courses or field experiences. Indeed, science education faculties tend to focus more on the older and simpler instructional applications of computer technology (e.g., computer assisted instruction, word processing) and older educational technologies (e.g., overhead projectors, calculators, slides) and less on exposure to and practice with newer, more sophisticated tools (e.g., electronic networks, hypermedia, digital cameras, integrated media, problem-solving applications), which support development of students' higher-order thinking and problem-solving skills. The results from this study corroborate Cagiltay, Cakiroglu, Cagiltay, and Cakiroglu, (2001) study which found similar results about Turkish teachers' view of using computers in education.

The results of this study showed that Turkish faculty members, who taught in public or private K-12 schools or universities (Section A, question 3), do not have enough information about how useful educational technology can be and they indicate an inadequacy in their preparation to use computers and other technological tools in their classroom (see Tables 3, 4, 5, 6, and 7). In some cases, Turkish faculty members (educated in Turkey), who taught in public or private K-12 schools or universities, work with Turkish faculty members with degrees from western universities. However, they still are not using the available educational technology on a regular basis (see Tables 3, 4, 5, 6, and 7).

It is not enough to purchase the equipment, it is also important to have support and be empowered to become effective learners themselves. As an example, in this study many universities have computer rooms for students and offer technology courses. Almost every faculty member in Turkey has a personal desktop or laptop computer (Turkmen & Pedersen, 2005; Usun, July 2003b). Yet, the results showed that Turkish faculty members with degrees from Turkish universities did not use educational technology in their classrooms (see Tables 3, 4, 5, 6, and 7). The data from this study also reflects that the differences observed among faculty rank were mainly found between "Instructors and Assistant Professors" (see Tables 3, 4, 5, 6, and 7). One possible explanation is that most faculty members in Turkish universities have a Ph.D. In order to earn your Ph.D. degree, you must take technology courses, and have proficiency in the English language. This provides opportunities to read and understand current research and new approaches that utilize technology for education. It would seem that assistant professors have an advantage over instructors and are able to gain a broader understanding of technology through their program of study and subsequent reading and study. On the other hand, a lack of effective leadership and a lack of confidence to try technology integration themselves may be the primary reasons why technology integration is not being accomplished. Munday, Windham, and Stamper (1991) and Davies (2001) found that older teachers lack the confidence to use technology and prefer not to change their teaching style.

There might be many reasons for why older Turkish faculty members are one step behind where they need to be. They might lack the time and motivation to learn technology skills or use

technology. Technology could be very intimidating for many because learning how to use new technology always requires new learning, especially in the current rapidly changing educational system. Older Turkish faculty members must become more informed about educational technology and become more involved in integrating technology in their classrooms. Turkey needs more science education faculty members, like assistant professors, using technology to improve the learning environment for their students. In turn, their students (pre-service teachers) will improve the learning environments for their K-12 students.

This study also showed that Turkish faculty members with Turkish degrees do not have ability to use technology efficiently in science classes. According to current OECD research (over 250 thousand 15 years-old students from 41 countries), Turkey is significantly behind many other OECD countries in science, problem solving in math, and reading, (Elevli, 2004). This corroborates the current study and other researchers who found that the most common reasons given for the low level of computer use in schools are limited access to equipment and lack of training (Akkoyunlu, & Orhan, 2001; Saglik, & Ozturk, 2001; Usun, 2003; Yedekcioglu, 1996).

From the current study, it is evident that these new professionals believe that technology support should become an integral part of teacher education and classroom curricula (see Tables 3, 4, 5, 6, and 7). New model programs should be characterized by required courses for pre-service teachers which teach them how to use instructional technologies and expose them to technology-rich higher education classrooms.

RECOMMENDATION

Technology has captured primary role in education. Global ICT was constructed by developing information technology and affected the structure of education and learning environment of education. Thus, computer, television, digital devises, and satellite have been using in order to teach as a powerful tool for children's learning by doing. We think that technology must be thought of as an integral component of the curriculum, a chameleon-like tool that can be used with almost any content. Computers can be used as writing tools, spreadsheets, and mathematical problem-solvers.

In developing Turkey, educational technology paid attention and placed in Turkish education system. Most importantly, computer has been integrated the science education curricula. In order to incorporate technology more fully into the classroom, teachers should be provided with the time and support to explore technology on their own. The government should provide the time ands pace for teachers, who now suffer from larger classes and more responsibility than ever, to take a break from teaching to start learning. Moreover, teachers should be treated like the professionals they are. Teacher creativity is a powerful force for positive educational change, but it can thrive only if it is unleashed and supported by Turkish government.

Finally, the Turkish politics and educators should make their interpretations of the current-desired knowledge gaps between Turkish faculties and somewhat confident that the technology aligns with standards, supports inquiry, advances students learning, then proceed in good conscience that the time and money invested in the technology should wisely spent. The modern technology that could potentially be incorporated into science curricula and teacher preparation program seem to be increasing at a rapid rate. And we do not forget that “technology alone does not create educational change. The power is not in the tool but in the community that can be brought together and the collective vision that they share for redefining classroom learning (Riel 1990, p 35)”.

REFERENCES

Akkoyunlu, B., & Orhan, F. (2001). The Use of Computers in K-12 Schools in Turkey. *TechTrends: for leaders in education and training*, 45(6), 29-31.

Bailey, G. D., Ross, T., & Griffin, D. L. (1996). Barriers to curriculum-technology integration in education. *Educational Considerations, 23*(2), 4-17.

Bell, L. (2001). Preparing tomorrows' teachers to use technology: Perspectives of the leaders of twelve national education associations. *Contemporary Issues in Technology Education* [Online Serial] 1. Retrieved December 22, 2004, from http://www.citejournal.org/vol1/iss4/currentissues/general/article1.htm

Elevli, N. (2004, December 8). Iste Egitimin Hali: Anlamiyoruz Cozemiyoruz. *Milliyet*. [Online]. Available: http://www.milliyet.com.tr/2004/12/08/guncel/gun10.html

Hizal, A. (1991). *Turkiyede Egitim Teknolojisi Egitim Bilimlerinde Cagdas Gelismeler. [New Educational Technology Approaches in Educational Sciences in Turkey]*. Eskisehir: Anadolu Universitesi, Acik Ogretim Fakultesi Yayini. [Eskisehir: Anadolu University, Open Educational College Press.]

McIsaac, M. S., Murphy, K. L., & Demiray, U. (1988). Examining Distance Education in Turkey. *Journal of Distance Education*, 9(1), 106-119.

Metiri Group. (2001). *Metiri group Faculty Technology Survey*. Retrieved May 11, 2004 from http://tools.metiri.com/survey/samples/FacultySurveySample.pdf

Odom, A., L., Settlage, J., & Pedersen, J. (2002). Technology knowledge and use: A survey of science educators. *Journal of Science Education Technology*, 11(4), 391-398.

Pedersen, J. & Jernick, R. (2000). Technology in science teacher education: Survey of current uses and desired knowledge among science educators. *Journal of Science Teacher Education*, 11, 131-153.

Petrakis, E., (1996). Using a portfolio to assess pre-service teachers' technology competence. *Journal of Computing in Teacher Education, 13,* 12-13.

Riel, M. (1990). Building a new foundation for global communities. The Writing Notebook (January/February), p.35- 37.

Saglik, M., & Ozturk, S. (2001). Television as an Educational technology: Using Television at Open Educational Faculty, Anadolu University. *The Turkish Online Journal of Distance Education*. ISSN 1302-6488, 2(1).

Stanley, R. B., Lindauer, P., & Petrie, G. (1998). Factors that influence teachers' use of computer technology. *ERS Spectrum, 16(3),* 42-46.

Turkmen, H. & Pedersen, J. (2005). Examining the Technological History of Turkey Impacts on Teaching Science. *Science Education International*, 17(2), 115-123.

Usun, S. (2003). Educational Uses of Internet in the World and Turkey (A Comparative Review). *The Turkish Online Journal of Distance Education*. ISSN 1302-6488, 4(3).

Yedekcioglu, O. A. (1996). Use of Computer at High Schools in Turkey. *Online Journal Technological Horizon in Education*, 3(6), 64-69.

Windelspecht, M. (2001). Technology in the Freshman Biology Classroom: Breaking the Dual Learning Curve. *The American Biology Teacher*, 63(2),

International Journal of Education and Development using Information and Communication Technology (IJEDICT), 2006, Vol. 2, Issue 2, pp. 82-99.

Long distance training for rural women craft producers

Margaret Perivoliotis-Chryssovergis
Technological Educational Institute of Athens, Greece

ABSTRACT

This article describes a Hellenic distance learning/e-learning pilot study, focusing on women in remote or rural areas who are professionally or occasionally occupied with the production of artefacts, mainly textiles, without having any education in design, informatics, marketing or management, due to their residential location and life-style constraints. Also proposed is a partial solution to the exclusion and unemployment that is still rife in many East Mediterranean and Middle-East countries. A special educational module was developed using computer and information and communication technology. It was piloted with selected participating rural women, offering them fundamental design education, computer training, and basics on management and marketing.

Keywords: *Craft production; Design education; Information and communication technologies; Distance learning; unemployment.*

INTRODUCTION

The work presented here focuses on the educational/economical isolation of rural women and the consequent effects on their life. The research field is rural women, most of whom wish to work, or work locally in the production of handicraft items without having any special education or having only a minimal basic one. Women's lack of opportunities and unemployment are still serious drawbacks, global social phenomena that governments are facing, and economic problems that are always effectively present. They result in isolation, exclusion from society, economical extortion, and "disability" in the broadest sense. The majority of rural women declare as their occupation either "farmers" or "housewives", which actually means "unemployed", since it is an occupation that does not offer them any personal income, regardless of the efforts and labour involved. Statistically that means an unemployment rate of 80% of the female rural population of East Mediterranean (TEI Bureaux of Research, 2004). Only in Greece the official total women's unemployment in the country has risen to 21% the last year (Hellenic Bureaux of Statistics, Sept. 2005), while the present national women unemployment is 14.5% (EU statistics, Hellenic Ministry of Economics, February 2006).

The rural location, the different cultural backgrounds and the low educational level have resulted in a low level of professionalism of these women. Lack of know-how in the development of new products and designs, of innovation in product design, of aesthetics and knowledge of the true tradition and heritage, of new technological developments, and the possibilities of reconciliation of the hand-made quality with the new technology, are the main problems of the Greek rural female population that is involved in craft production. Little or nothing is known about the role of information and communications technology.

The project is facing the problem, seeking solutions via design education, training and through promoting the home and cooperative craft industry and production. It also discusses the growing importance of knowledge sharing and the potential contribution that information and communications technologies could make to women inclusiveness. The use of information and

communications technology could encourage information flows among women handicrafts, positively contributing to their learning and product innovation.

The aims of the project were to create new opportunities, visions, directions and inspiration, for women in the craft production sector and cooperatives; to support them to adapt new technologies and become more competitive; to assist them penetrate the tourist textile market; to provide a distance-learning program to women in rural/remote areas, members of handicraft cooperatives, and to establish an information/communication network. The network could assist them to combat their isolation and exclusiveness and to improve their efficiency at a national and global level.

The objectives of the project were to promote interactive craft design research in the university environment; to analyse craft education from a cultural point of view; to facilitate a dialogue on the benefits and limitations of new technology, of information/communications technology, of globalisation on craft design, production and application; to promote the adoption of new strategies in the development of continuous vocational training.

The undertaken research proved that the lack of cultural definition and identity could have, in the long run, a negative effect not only on the development of innovative products, but mainly on the economy of the local craft companies. A special strength of Greece is its cultural heritage, due to its location between East and West, Asia and Europe. Greece is geographically and culturally in between two worlds, with powerful cultural heritage and great emphasis on traditional arts and crafts. So far, local craft production has not succeeded in taking total advantage of this. The project focused on improving the cultural significance of craft items and textiles with the use of new technology. Thus the knowledge of heritage becomes an important marketing tool, since design is one of the basic components of marketing.

THE DEVELOPMENT OF CRAFS THROUGH THE AGES

In the context of manufacturing, we can define production as the entire pre-planned and applied processes and operations that transform materials into predetermined products. The development of these processes constitutes the production as practiced at the manufacturing units. Handicraft, light industrial and industrial companies constitute the manufacturing industry.

At first, craft manufacturing was performed manually. The replacement of manual labour to a greater or lesser degree by mechanical methods resulted in the quantitative improvement of production, in many instances improving the quality while in others causing it to deteriorate. Today, because of global production practices, industries produce goods that are almost identical. On the contrary, goods produced by specialist companies, primarily manually, may look alike but are not identical. They maintain their own aesthetic, character and value, thus remaining unique.

Recently, the craft companies have turned their attention to producing hand-made traditional artefacts, for their unique aesthetic value. The fundamental characteristic of a hand made article is its uniqueness, as opposed to the manufactured ones. Since no two hands can repeat identical motions, these items are not carbon copies. Therefore, in this sense a hand-made item can even be any product that is produced by electric-powered machines, which are guided directly by human hands. A good example of hand-made products is hand-woven and hand-tufted rugs.

The craft business has become a medium of cultural transaction, via the increase of tourism, though it is suffering, in many instances, from lack of identity, due to the imitation or duplication of designs, lack of design quality and lack of production quality, very often due to the producer's low

educational level. The coexistence of tourism and handicrafts vanishes in history with the textiles being a great travellers' attraction, since the Egyptian and Aegean era, (Richard, G. 1998). It is evident that travelling was quite limited, at that time, to few intellectuals with curiosity. Democritus, Herodotus, Plato, Aristotle, Ptolemy were some of the well-known travellers of the ancient world. It is a fact that via those travellers curiosity, fabulous hand made pottery and rare hand made textiles of the ancient world moved from country to country, thus inspiring local designers and craftsmen not only for the creation for new artefacts, but also of new forms of design and decoration. Thus Culture was transplanted from India and China to Egypt and Rome, and from the southern Mediterranean countries to northern European and Asian ones, inspiring local masterpieces (Perivoliotis, M. 1998).

The last two centuries travellers' attraction by local handicrafts has been more evident. Their interest for traditional textiles is a phenomenon with increasing sequence not only for those of the exotic countries production, but also for all tourist places. A determining parameter for the 20th century is the lightweight of most of the textiles and their by-products, making their transportation easy, especially with our modern air-transport, and thus textiles have become a modern medium of cultural data transaction among nations and people.

Greek Craft Cooperatives

Cooperatives are particularly significant for the Greek economy, with 90% of businesses having less than 15 employees, of which 95% are women, of which 85% are producing textiles and fibre products, (Hellenic Organization of Small and Medium Enterprises, 2003). Textile cooperatives are the only source of employment growth among women in certain remote areas. A cooperative is a society with common activities and common economical aims among its members, pursuing their economical and life style improvement. It has a legal face, requires seven minimum voting members, general assembly and director. Their target is the improvement of the member's ability to produce, the maximization of sales, the minimization of product cost, the optimisation of work conditions. The cooperative offers an economical, social and organizational framing that includes common purchase of row materials, common sales of craft-products, common structure of modern production units and common presentation of the products.

Handicrafts textile cooperatives retain a small, but very important "niche" in the global market, because they are linked to the retention of regional and local traditions, the provision of jobs, especially for women in rural and remote areas, and the preservation of a level of quality and exclusivity, which cannot be found in manufactured items. Securing jobs in the handicrafts sector has, therefore, a social and cultural significance, besides its economic one for rural/remote areas, especially for the developing countries, where it is a possible way to save women from becoming economic refugees.

Craft producers fall basically into two groups: professional producers who earn their living from sales, and those who produce craft items along-side another occupation, generally farming. The first group of producers is open to new developments, has a good distribution network, has some kind of education and training and high level of interest in seeing and learning modern techniques and design improvements. The second group draws its members mainly from among women, and craft production is a source of additional income for many of them. The basic outlet of handicraft women is the local market, despite the fact that foreign markets appear to be interested in handicraft products. Their ability to penetrate new markets is non-existent with complete lack of knowledge concerning the means that can be used in order to approach the consumers (Phillipoulis, A., 1996). Some of them collaborate with tourism retail shops but not on a regular basis. In many cases, their textile products, produced in their spare time during the long winter evenings, along with cooking, cleaning, bringing up children and attending to domestic

animals, are sold right outside their own homes which also operate as exhibition stores. In Greece only one women's cooperative is exporting to foreign countries and collaborates with wholesalers (Hellenic Organization of Small and Medium Enterprises, (Ministry of Development, 2002).

Governments wish to promote the handicraft business and a simple way is women's work-placement in handicraft production cooperatives, mainly for the tourism business, which could be composed and run by them. Basic constraints of this simplified solution are the training and educational deficiencies of the majority of rural women and the fact that the most productive ones will be middle aged, those past child bearing.

Another important issue is the variety of operational modes that characterize the handicraft industry and the training requirements involved. External support from experts could be a prompt and effective way to remedy these deficiencies, but appears to be in general financially prohibitive. Improvement of skills up to a certain level, especially through distance education and training, provided at home or at the workplace, is the most realistic way for these women to become gradually more competitive and survive.

The Greek cooperatives are producing mainly traditional items for local and tourism use. Their range includes all kinds of hand-made items but sales are strongly related to "useful" items, particularly textiles. The textile production was, and still is, mainly a job for women, and the most time consuming one they undertake. Local products are used and the so produced artefacts are sold to local people or visitors. Techniques and equipment are largely handed down through generations. Unfortunately designs, which have been handed down from mother to daughter and reflect local history, religion and customs, have been often debased during the last few decades, due to uncontrolled production. Globalisation is an extremely broad and complex phenomenon that undoubtedly represents a threat to cultural identity and diversity. Craft production is a form of culture that faces the threat of loosing its identity and diversity if it submits to the culture industry. Deep knowledge of local tradition and vision could be strong supports against defeatism.

THE CASE STUDY

The case study was undertaken and completed by the research team of Technological Educational Institute, (TEI) of Athens, Textile Design Studio. In the present case study participated three design professors, one professor of electronics, four practical trainees, ten final degree projects, ten women cooperatives from selected pilot regions of Greece, covering the mainland, from Thrace to Peloponnesse, and the Ionian and Aegean islands. The students, within the framework of their final degree projects, undertook research, under the guidance of their educators, on:

- *Handicraft women*, their products, designs, working conditions and skill needs. The research was curried out to the ten selected pilot regions of Greece,
- *Traditional designs,* by creating a database from museums collections that was included in the module as a possible source of inspirations,
- *Local craft production*, the ways of production, the constrains, the marketing, the outlets,
- *Analysis* on the possibilities of product/design innovation/diversification.

The steps or the case study consisted of:

- *Two (2) years* of investigation into the workings of the craft production industry and women craft workers in rural areas;
- *One (1) year* for the completion of the long distance learning module;
- *One (1) year* for dissemination of the module within ten special training seminars, offered all free for the ten participating handicraft women cooperatives, tutored by the participating design professors.

The Case Study Questionnaire

An important element was to improve the marketing of handicraft products. In order to support the marketing effort of local women producers, a major survey was conducted on craft business to the ten pilot regions. The research was carried out among rural women craft producers, some located in remote areas, self-employed or within small cooperatives, oriented to domestic rather than foreign markets. Their production, offering them minimal basic income, was limited to wool and silk woven products, in the traditional way, often in loom-woven quality and coloured, in most cases, with natural dyes from local plants.

The researchers, in order to obtain an accurate image of problems, needs, necessities, so that they could come with possible solutions, asked the participating women to complete a shelf evaluation questionnaire. The addressed questions were on their general and art/design education, craft-type of production, product inspirations/prototypes, quantity of production, target groups of purchasers, type of quality control - if any, their skill needs, problems, required solutions. The questionnaires were organized under the following headings and sections:

- Who are these women and where is this cooperative?
  - What type of craft production?
  - What is the size of the cooperative and the organisational profile?
  - Who are the women involved in craft production?
  - Where is the cooperative based?
  - What is the size of its operation?
  - Who does supply them?
  - To whom do they sell?
  - Where do they distribute?
- What do they produce?
  - The type of products the company produce (textile qualities, household, clothing, fashion, fibre products, etc),
  - How specialized or diverse is the product range?
- How do they produce these products?
  - How are the products designed?
  - How are the products developed for the production stage?
  - How is quality controlled within their production system?
  - What types of production systems are they using?
- Commentary
  - Any comments that need to be added,
  - Other activities of these women that need to be added,
  - Are there any confidential restrictions to publishing this information or using for educational purposes?

Research process

The operational problems these women were facing were many and the efforts were focused on pointing them out and propose possible solutions. Certainly it is unrealistic for all to receive training in design and all the vital operations of an enterprise, and the low educational level of rural women makes this even more difficult. The research was supplemented by selected data from four governmental and semi-governmental associations.

Two particular difficulties were encountered during the survey. The first difficulty stemmed from their rural location and their different cultural backgrounds. This required an additional effort for the effective coordination of the project and attention to cultural differences in interpreting the material and information collected. The second difficulty stemmed from their low level of professionalism and relatively low educational level, making them unable to articulate their needs and training requirements well. It was difficult for many to discuss concepts and practices that are common knowledge in any business environment, such as management and marketing.

Research data obtained

Research has shown that there are many factors responsible for the exclusiveness and isolation of women handicraft producers. The main findings can be summarized as follows:

- The location of women handicraft producers, away from the urban centres, in remote rural and often isolated areas,
- Lack of know-how in the development of new designs and products,
- Lack of innovation in handicraft products,
- Lack of aesthetics and knowledge of the true tradition and heritage,
- Low-level design and basic education,
- Lack of know-how of management and marketing,
- Lack of cooperative spirit,
- Lack of innovating products appealing to purchasers.

The main findings in relation to the women *training needs* could be summarized as follows:

- In Management
  - Lack of cooperative spirit and entrepreneurship,
  - Lack of motivation and effective human resources management,
  - Inability to deal effectively with accounting and financial management (cash flow, cost analysis).
- In Production Organization
  - Lack of rational allocation of tasks,
  - Inadequate planning and monitoring of production,
  - Stock management,
  - Time management.
- In Marketing
  - Lack of understanding of market research,
  - Lack of distribution networks,
  - Inadequate implementation of sales promotion methods.

- In Technology
  - Lack of knowledge of new production systems/technologies, of computer and information technologies,
  - Slow adjustment of production to new techniques of accounting and management,
  - Difficult coexistence of hand-made quality with new technology.
- In Design
  - Lack of know-how in the development of new products and designs,
  - Lack of innovation in product design,
  - Lack of aesthetics and knowledge of the true tradition and heritage.
- ***Managerial skills*** were examined by looking at the following two aspects of managerial capacity:
  - The level of organizational development or organizational competence of the handicraft cooperatives,
  - The level of management competence with regard to leadership.

Analysis of Data

Overall and in all respects, findings were very disappointing. External support from experts could possibly remedy such deficiencies and the support of private consultants could also be valuable for the introduction of information and communication technology and the use of computers in the design process, but appears to be generally financially prohibitive. Their location away from urban centres, in remote rural areas, makes it even more difficult. It is also important for all women craft producers to obtain basic awareness of the existence of information and communication technology (Frangopoulos, S. 1997). Most women are working with the traditional designs and means of production. The economic and operational structure of handicrafts industry, combined with the demands of the tourism market for tradition, does not allow them radical interventions. They are lacking skills either in terms of production for the market or in terms of pricing, market and communication.

Findings

The majority of the interviewed women, in 7 out of 10 cooperatives, do not have the ability to investigate the demand for their products and identify appropriate markets, including the “niche” markets that exist for high quality handcrafted textiles. In 5 out of 10 cooperatives management competence could be rated as definitely inadequate, and only in two it was considered as rather adequate. Organizational competence was found to correlate strongly with management competence, and in most cases, there was hardly a proper manager’s role established and functioning within the organization of the cooperative. Elected chairperson who took on the role of director had a low level of general education and lacked basic management skills and know-how to perform with minimal success a manager’s role.

Some thought that management capacity could be strengthened by using external consultants or by hiring a manager. However, external consultants or a hired manager cannot substitute the need for a cooperative leadership that has a minimum management competence, and anyway that would be financially preventing. This situation underlined the need for a proper management function, which would include accounting and finance management.

In most women cooperatives (8 out of 10) there was a task allocation system that takes account of the particular production skills of each member. However, since work allocation concerns only

production, the managerial, design and marketing processes failed to be active. It was necessary for cooperatives to allocate work responsibilities not only in relation to the production processes, but also to the managerial, design and marketing processes.
A basic characteristic of women handicrafts cooperatives was that they are strictly limited to the production of large size traditional textiles or textile products, with high cost. Although it is very important to keep the traditional character, it is also important to re-orientate their production towards new products or designs, which can be produced effectively with low cost, are light weighed and appealing to air-travelling tourists. This is a question of product diversification and the development of a range of products that may be addressed to different target groups (specialist, exclusive tourists, air-travelling tourists and everyday users).

The most important skills deficiencies were in the areas of education, design renovation and management. Their design education is limited to what is offered at school, which is to say none, or minimal, or whatever is handed down to them through tradition, with the artistic creation depending on self-made decisions of self-employed artisans. Actually 90% of them have no specialized education, 50 % of them have a high school (three years) diploma, 20 % have lyceum diploma (six years post elementary school education), 90 % were unable to produce new designs or run a business, but 100 % wish some kind for training in designing, 60 % in pricing, 50 % in marketing, 70 % in accounting, 50 % in management, 40 % in informatics, and 30 %, a small but significant minority, declared that they need an external expert in order to cover their needs. Almost all women (in 9 out of 10 cooperatives) wish and believe that it is possible to introduce information and communication technologies because it could support many activities, such as distance education, world-wide information, design evolution, management and marketing, that at the present time cannot be easily developed. The majority regards their equipment as inadequate and require the introduction of computers and computer-assisted design.

Interpretation

The first conclusion, concerning rural women handicrafts cooperatives is the lack of systematic work organization. Cooperatives should select members or hire external employees-experts to undertake the following operations:

- Management (human resources, accounting and finance)
- Production (organization, planning and monitoring the quality control)
- Marketing (design - product development/diversification, sales promotion, distribution networks).

The second conclusion is the difficulty for cooperative members to attend training courses for all the issues that are vital for them.

In order to improve the design ability of rural women handicrafts, the research team offered them a basic long-distance/e-learning educational methodology that would meet their skill needs, regardless of their operational/educational differences and location, with basic, simplified, lessons on design, colour, design development, communication technology, marketing know-how. The module was offered in CDs, a form suitable for distance learning and e-learning, hard copies – preferred by elder women, and within the web site of TEI. A database on cultural heritage was also included for the common use of all the participating women.

THE MODULE

The special training package was offered to the pilot women craft producers, assisted by the development of a simple Computer Information/Communication System, an email and Internet network. A simple database was created within the Technological Educational Institute (TEI) web

site offering examples and inspirations on design and craft products based on traditional prototypes. Since it was of the utmost importance to them to be able to run a modern business, very simple training modules on entrepreneurship (management, accounting, production, marketing) and technology (computer usage) were included, designed by the participating professor of electronics (figure 1). It is a special, for women handicraft producers', multi-skill development offering them distance learning accessible in many forms, including free access through the web.

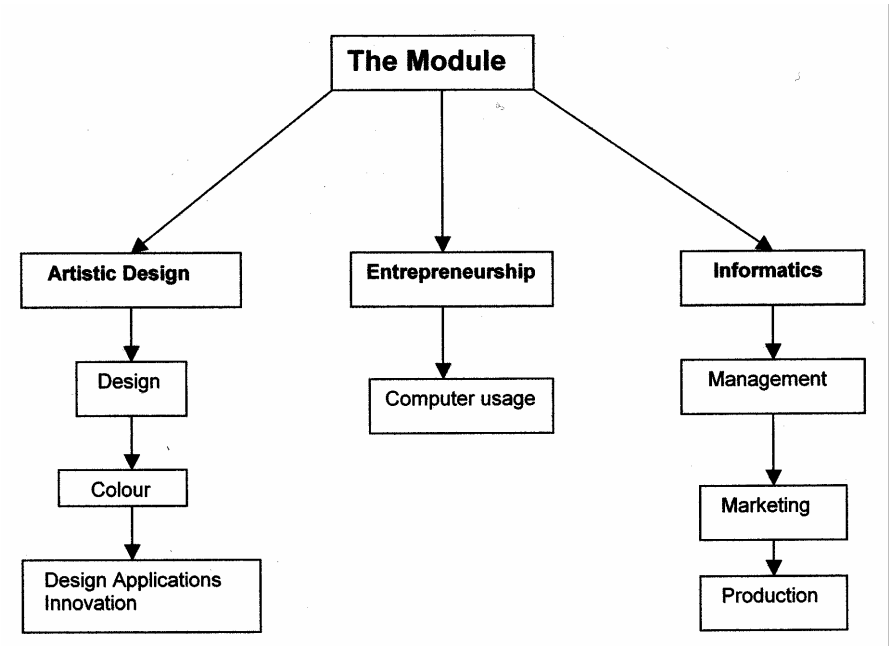

Figure 1: *The three topics of the Training Module, with their sub-topics. Basic principles offered with a very simple language, methodology and many examples.*

The objectives of the package were:

- The development of a user-friendly training program, which responds to the needs of unemployed women or uneducated female members of cooperatives who live in remote areas providing vocational training through distance learning in the design and production sector.
- The possibility for the development of a network that would support the exchange of design information and technological know-how between women artisans and craft producers, thus promoting the continuous, on the job, training.

The training program covers topics that refer to designing and producing quality craft products, mainly textiles, in the organisation of a craft business and in the development of entrepreneurship. The context of the training program includes:

- Artistic design (Colour, Design, Application),
- Informatics (Computer Usage),
- Entrepreneurship (Management – Marketing - Production)

The module used a very simple language and methodology, adapted to the women's educational level, assisted with visual presentations and examples from their culture and heritage, in order to make it more educational and attractive. Simplified, basic knowledge in all areas was offered, particularly in the artistic field, hoping to inspire the imagination and creativity that has for so many generations nourished local traditional cultures. Simple lessons on the principles of design, the use of colours, the traditional designs and media of production, fibres and textiles were included in Artistic Design, (figure 2).

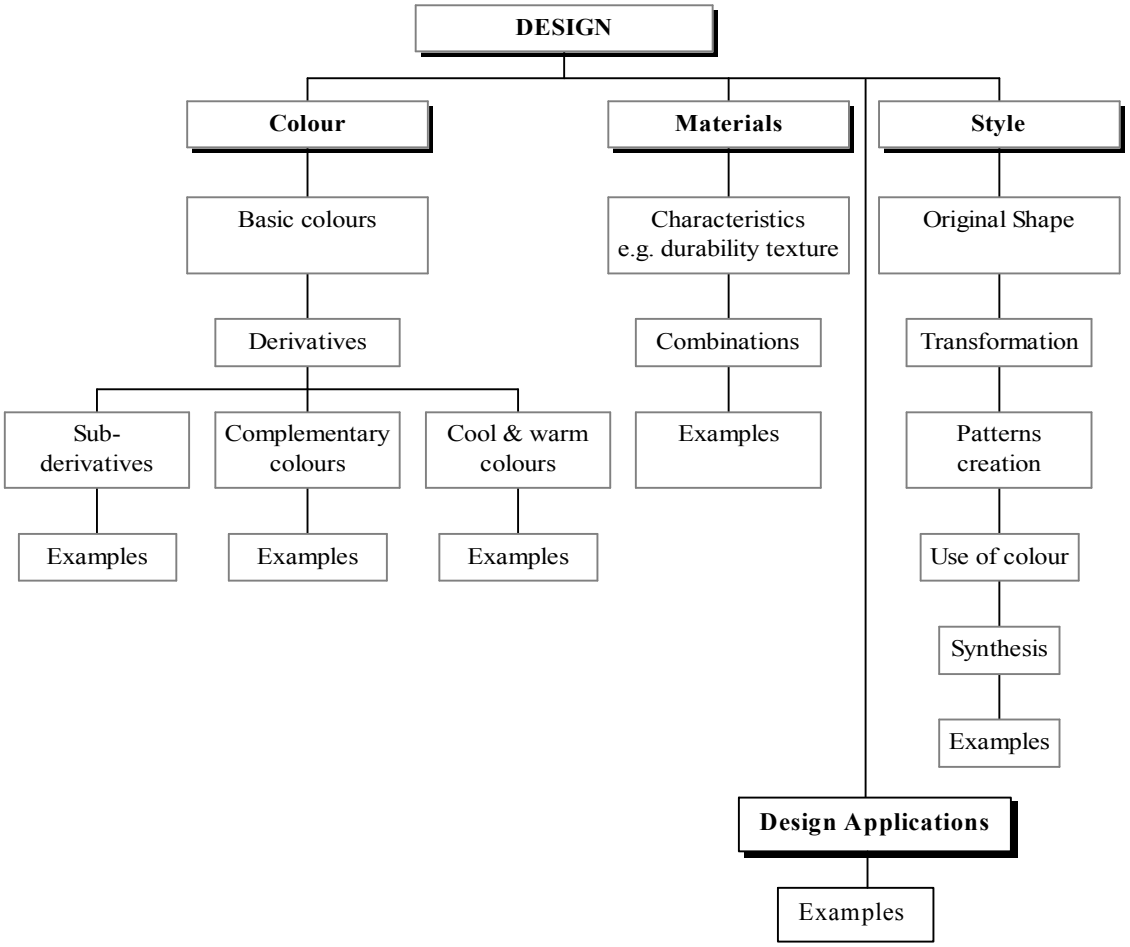

Figure 2: *The detailed structure of the Artistic Design with all the included sub-sections in detail.*

Step-by-step examples of design development, colour combinations and new product development were also part of it, all inspired by the well-known traditional prototypes. Inspirations were always presented together with the final designs/products in order to offer a paradigm on thinking, imagining, designing, creating. Simple examples of computer use were offered, together with basics on management, marketing and production, all with examples (figures 3, 4). The participating design professors guided the degree students to select the cultural data, create the

design examples of the module, develop the design/colour methodology, and delivered the educational module by tutoring it with seminars and via the web.

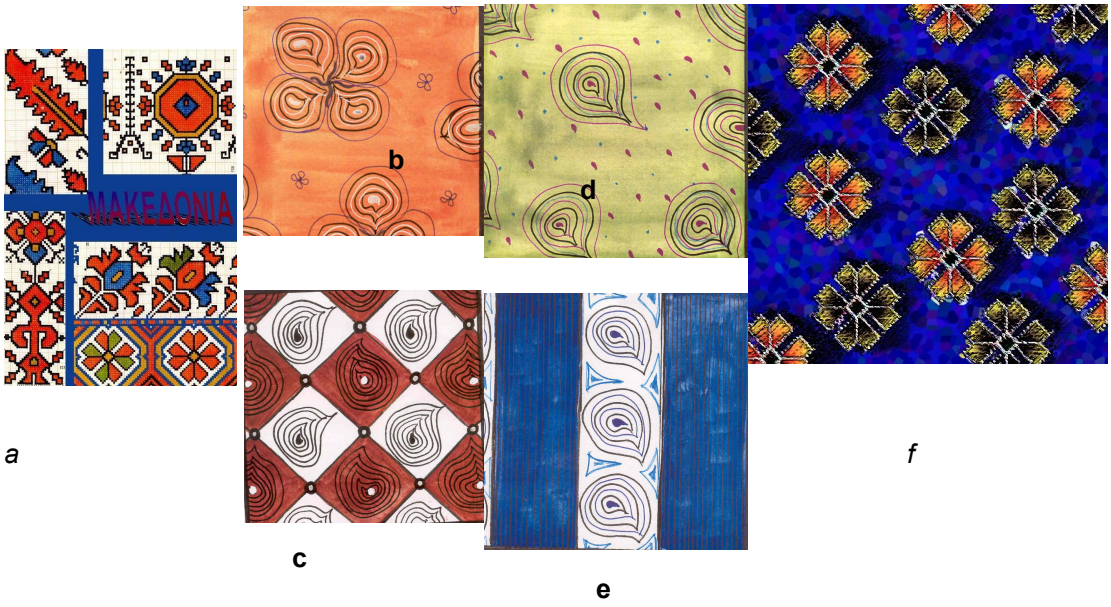

Figure 3: *Examples of the proposed design methodology and computer-design work, as presented in the module with step-by-step colour/design examples. They are paradigms of the different ways/possibilities and colour combinations an inspiration can evolve:* ***a****, inspiration derives from the northern Greece traditional embroidery. The lower right flowers are simplified,* ***b****, and evolved in different ways and colours,* ***c, d, e.*** *An example of computer designing is additionally offered,* ***f****. The participating students of TEI Textile Design Studio, under the auspices of the design professors, created all designs.*

The reasons to move from traditional teaching or training processes towards distance learning were many. The vital one was the location of the participants and their educational differences. Additionally, for the Artistic Design field the usual learning way is the individual, studio-based culture, with design learners preferring a practical, visual, learning approach. Design learners are also 'visual thinkers'. They respond well to materials/activities that provide them with the stimulus to create something. The module was designed with the qualities of being attractive, colourful, practical and simple, in such a way that learners with different backgrounds or learning disabilities and preferred learning approaches will feel motivated and gain the best possible learning results from it. Since traditionally, the most important type of learning resources used to be paper-based, print-based materials were offered. Actually it was a challenge for the research team to determine the women preferred learning approaches/necessities and related social and cultural issues, and to design the right learning environment to meet their needs.

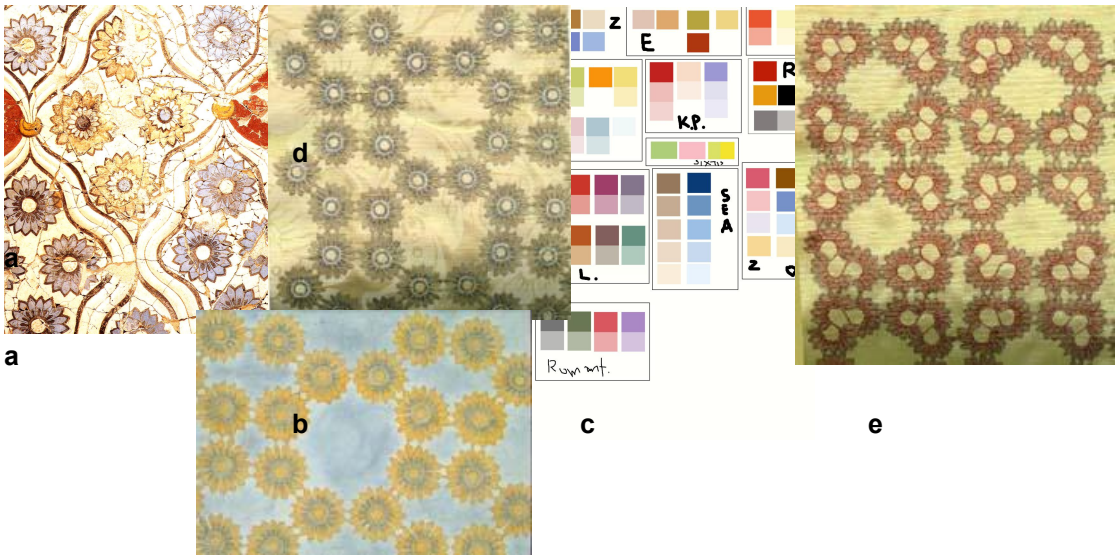

Figure 4: *Examples of the proposed design methodology, colour combinations and textile production as followed by the participating cooperatives with the assistance of the research team:* ***a*** *inspiration,* ***b*** *hand design,* ***c*** *chart of possible colour combinations,* ***d, e,*** *textiles produced. Participating students of TEI Textile Design Studio, under the auspices of the design professors, created the design work and colour chart. Participating women produced the textiles.*

Figure 5: *Examples of product diversification: Proposed design/product innovation/ re-orientation: b, c new dolls and marionettes, inspired by, and representing, the Greek mythology and local myths. They are lightweight, suitable for air- travelling tourists, children souvenirs, (local and international), and local theatrical children performances. They are new products that open new markets including the tourist, the local and the stage ones. They were proposed and designed by the participating students, in order to replace the overworked traditional dolls, a, and produced by the participating cooperatives.*

The Artistic Design part is trying to help women craft producers to visualize evolutional, innovative design possibilities of well known and overworked designs, to open up their minds in designing, in new technologies and possibilities, (figure 5), and not to force specific designs and applications on them. The approach adapted media and technology and computer-aided design work that were of interest to most of them. The module minimizes their working time, offers many possibilities, has versatility and has the advantage of offering what the market demands today, without thrusting aside human inspiration and creativity, nor personal originality and uniqueness. The case study indicated, as the best approach the adaptation of hard copies for those of elder ages and lower education, computers, CDs, the Internet and e-mailing for the younger and more educated ones. The benefits of the use of these systems for supporting rural women learning are opportunities that would not otherwise exist: flexibility, easy communication, time for learners' reflection, interaction over time and space.

CONCLUSIONS

The proposed design work, by being accessible through the Web, provides a suitable forum for an exchange of cultural information and design experiences, and where design/design ideas/inspirations have been traditionally articulated in print can be also accessible via the Web. The establishment of future thematic networks was also proposed. It can enable the creation of networks for cooperation and utilization of synergies and will support rural women producers to communicate, since if isolated, might be neglected or not utilized in terms of their advantages.

Linking up with the site all interested women could find ways for:

- Development of new products and designs, from the very many offered, step-by-step, examples together with the colour/design methodology,
- Innovation in their product designing, by adapting to the proposed possibilities of product diversification,
- Paradigms on aesthetic developments among the many offered examples of right and wrong colour combinations and design developments,
- Knowledge of the true tradition and heritage from the simplified lessons on tradition and history of Hellenic Design, and from the included cultural data,
- Basic awareness of new technology, via the step-by-step lessons of computer usage,
- Basic awareness of marketing from the simple, with examples, marketing principals,
- Basic awareness of management, offered with simplified rules and basic examples

All the above can offer them:

- New Opportunities to expand production, activities, inclusiveness into the new market system,
- New Visions for new products/designs,
- New Skills, to enable them to create modern, appealing to a great variety of customers, products, to assist them to stay alive in the market, or become competitive under the immense pressure posed upon them by external production changes and the expansion of high technology applications,
- New Technologies, for efficient and less time consuming designing/production,
- New Directions to new market, local and international,
- New working, producing, selling Environments

The cooperative women of the ten pilot regions produced craft items, selected from the participating students design creations, following the proposed colour/design methodology, (figures 3, 4, 5). The productions were decided with the assistance of the research team and with criteria to fulfil modern demands, bear the local identity, have high quality, adapt to the rules of market, agree with the tourists' taste, in a search for balance between the lowest possible production costs, the protection of craft products competitiveness, and the maintenance of a good image that satisfy consumers and pressure groups. The so produced craft products were evaluated on the aforementioned parameters by the research team and the National Craft Bureaux.

RESULTS

The unique feature of this project is that it provides the opportunity for rural women to explore craft design and production issues from their home base, enabling effective sourcing of design information. The module and the TEI web site provided opportunities to women in remote/rural areas to obtain access to develop the skills necessary to become competitive, to draw them from their economical isolation, to help them succeed inclusiveness in the modern world, and to promote equality of opportunity for women workers.

The delivering of distance learning transferred design, introduced ways of creating culture, value, social and environmental quality. The project pointed to the participants the importance of cultural continuity and cultural/historic resources, of cultural and social exchanges that derive from tourism and of local processes and materials, and of the craft production to the regional growth in the concept of economic and social development.

The three parts of the module were tested and evaluated by the TEI research team and the National Craft Bureaux. New designs and new products resulted from the adoption of the module. New technology was added in their production system. The Hellenic Organization of Small and Medium Enterprises, (EOMMEX), together with the Ministry of Employment and the Organization of Women Equal Rights have offered financial support, in the form of long-lasting loans, to all women cooperatives in order to obtain the necessary New Technology.

The ten participating cooperatives transferred production towards new products/designs; all adapted the use of computers and Internet into their work environment, use accountants to improve their finance, and members of three cooperatives are now using computers for designing purposes. Collaboration between them and professional designers has started in a network form. Greek professional designers are interested in the handicraft tourist business and the production of handicraft items. They are assisting them in designing and offer outlets for their products into the Greek households. This, in the long run, will stimulate provincial youngsters to become involved, take up positions in their regional businesses, and offer financial opportunities and inclusiveness to women and people in remote/rural areas.

The Athens Olympic games offered to women cooperatives new opportunities and directions in the tourist market. They realised the importance of high quality, with local identity, craft products. The retail sales of tourist products during this period have passed the €728 million, (Hellenic Ministry of Economics, 2005), of which a great part was for local high quality craft textiles and cultural products. Totally more than fifty Greek handicraft cooperatives have interested in the module. They were benefited from its study, either directly compiling information, or indirectly, by being able to use the module for designing purposes.

The module has opened opportunities and possibilities for women, and at the same time has assisted in bringing more up to date knowledge and experience in the craft production

environment. In times of global networking, increasing competition, persisting unresolved economic problems, women handicraft producers must endeavour, more than ever before, to link their tasks to wider objectives, if they wish to escape from exclusives and disability and to obtain the inclusiveness they deserve.

REFERENCES

Bhamra, T. (1998), "A Cross–sectional Approach to New Product Development", *Design Journal,* 3/1998.

Britton, A. (1991), "The manipulation of skills on the outer limits on function, craft, skills, and imagination", *Crafts Council*.

Bonk, C. J. (2002), *Online training in an online world*, Bloomington.

Bonk, R. & A. Wisher, A. (2000), *Applying collaborative and e-learning tools to military distance learning: A research framework*, Technical Report, US Army Research Institute for the Behavioral and Social Sciences, No 1107/2000.

Boshier, R. (1997), Best and worst dressed web courses: Strutting into the 21st Century in comfort and style, *Distance Education*, Vol. 18, No. 2/1997, pp. 327-348.

Byun, K. & Hallett, C. (2000), Supporting instructors in the creation of online distance education courses: Lessons learned, *Educational Technology,* Vol. 40, No 5/2000, pp.57-60.

Carr, S. (2000), As distance education comes of age, the challenge is keeping the students, *The Chronicle of Higher Education,* Vol. 46, No 23/2000, pp. 39-41.

Casey, M. (1999), "My Disillusionment with Popular Culture", *ARTTU, 3*.

Chamber of industry, (1999), "Data on Hellenic textile manufactures".

Champagne, M. V. & Wisher, R. A. (2005), *Design considerations for distance learning evaluations*.

Crafts Council, (1999), "The crafts and the economy".

Daniel, J. S. & Marquis, C. (1997), *Interaction and independence: Getting the mixture right,* Teaching at a Distance, 14/1997, pp. 29-44.

Design Council, (1998), "Design to compete".

Druker, P. (1974), "Management: Tasks, Responsibilities, Practices", *Harper Row*, NewYork.
Fiore & Kimple, P. (1997), "Understanding aesthetics", Fairchild Publications.

Frangopoulos, S. (1997), "Informatics", TEI of Athens.

Harrington, L. (1997), Technology Works Best When It Serves Clear Educational Goals, *Harvard Education Letter* Vol. 13, No. 6/1997, pp. 1-5.

Harrison, N. & Bergen, C. (2000), Some design strategies for developing an online course, *Educational Technology,* Vol. 40, No 1/2000, pp. 57-60.

Hawkins, J. Spielvogel, E. & Panush, E. M. (1998), National Study Tour of District Technology Integration: Summary Report*, EDC/Center for Children and Technology Report*.

Hellenic Bureaux of Statistics, 2005.

Hellenic Ministry of Development, 2002.

Hellenic Ministry of Economics, (2005), Statistics on Athens Olympic Games.

Hellenic Ministry of Economics, (2006), EU Statistics on unemployment.

Hellenic Organization of Small and Medium Enterprises, (2003), "Data on cooperatives".

Hellenic Organization of Small and Medium Enterprises, (2000), "The Greek Cooperatives' File", Ministry of Development.

Hellenic Organization of Provision, (1999), Handicrafts.

Honey, M. Culp, K. & Carrigg, F. (1999), Perspectives on Technology and Education Research: Lessons from the Past and Present, *U.S. Department of Education, Secretary's Conference on Educational Technology Proceedings*.

Horton, W. (2001), *Evaluating e-learning*, American Society for Training & Development.

Howe, T. & Dillon, P. (2001), "Cultural Niche and the Context of Craft, Design and Fine Art", Design Journal, No 3/2001, p. 50-56.

Institute of Hellenic Garments, (2002), "Export-Import Data".

Institute of Industrial Research (1999), "The Greek textile and clothing manufacture companies".

Jerard, B. & Husband, J. (1999), "Design and Ethnicity, West Midlands Clothing Enterprises", Design Journal, No. 1/1999.

Kalviainen M., (1998), "The professionally accepted Good Product", Design Journal, 1998/3, pp. 30-43.

King B. & Spring M. (2001), "The Design Process in its National/Regional Context", Design Journal, No 3/2001, p. 4-18.

Knott, C. A., (1994), "Crafts in the 1990's", Crafts Council.

Murphy, D. Jamieson, P. & Webster, L. (1999), What is flexible learning*? Flexible Learning Guide Number 1*, Centre for Higher Education Development, Monash University.

National Statistics Services, (2000),"Greek textile production data in the post war period".

Norman, D. (1998), *The Design of Everyday Things*, The MIT Press.

Perivoliotis, M. C., (1998), "Textile and Tourism", ATLAS Conference proceedings.

Phillipoulis, A., (1996) “Entrepreneurship”, TEI of Athens.

Press, M. & Cusworth, A. (1997), “A new vision in the making: Exploring the value of craft education in the information age”, Design Journal, No 1/1997, p. 12-29.

Ranson, B. (1999), “Craftwork, Ideology and the craft lifecycle”, Journal of design history, No 2/1989.

Rhoades, B. & Sweeney, K. (2004), “Changes in the teaching and learning process in a complex education system”, Necsi Research projects.

Richard, G. (1998), “Textile Tourists in European Periphery”, ATLAS Conference proceedings.

Rockman, S. (2004), *Leader’s Guide to Education Technology*, National School Board Foundation’s.

Rodgers, P. & Clarkson, P.J. (1998), “An Investigation and Review of the knowledge needs of Designers in SMEs”, Design Journal, No 3/1998, p.p. 16-29.

Rosenkrans, G. L. (2000), Assessment of the adult student’s progress in an online environment, *The Internet and Higher Education*, No 2/2000, p.p. 145-160.

Sandholtz, J. Rignstaff, C. & Dwyer, D. (1998), *Factors That Affect the Effective Use of Technology for Teaching and Learning: Lessons Learned from the SEIR-TEC Intensive Site Schools*, Greensboro, SEIR-TEC.

Schindler, M. (2000), “The Textile Routs Project - The Austrian Contribution”, Textile Forum, 4/2000.

Setamaa, P. (2000), “Visualizing and Sketching in the Design Process”, Design Journal, 3/2000.

Simon, S. (1998), “How can you design products that are usable and desirable?” ARTTU, 5.

Sotamaa, Y. (1999), “Handicrafts and the Passion for Quality”, ARTTU, 3.

Starr, P. (1996), Computing Our Way to Educational Reform, *American Prospect,* No 27/1996, pp. 50-60.

Sterk, B. (2000), “New departures in textiles”, Textile Forum, No. 2/2000.

Svengren, L. (1997), “Industrial Design as a strategic resource”, Design Journal, No 1/1997, 3-11.

TEI Bureaux of Research, (2004), “Women Inclusiveness”.

Additional information on local, European and global textile issues was obtained from the listed Web sites. They were included in the module as a source of global data.

http://europa.eu.int/comm/enterprise/textile/statistics.htm

Textile and clothing industry in the EU: A survey

http://www.euratex.org/

http://www.asbci.co.uk/

http://www.itaaonline.org/

http://www.fgi.org/

http://www.aedt.org/

http://www.apparelsearch.com/associations.htm

http://www.trendselection.it/

http://www.apparel.com.gt/

http://www.ilo.org/public/english/dialogue/sector/papers/bzethics/index.htm

International Journal of Education and Development using Information and Communication Technology (IJEDICT), 2006, Vol. 2, Issue 2, pp. 100-107.

An information technology enabled Poultry Expert System: Perceptions of veterinarians and veterinary students

D. Thammi Raju and B. Sudhakar Rao
Sri Venkateswara Veterinary University, India

ABSTRACT

The Poultry Expert System (PES) was developed using Visual Basic 6.0 and MS Access on selected dimensions of poultry farming. Its efficacy was tested among the Veterinarians and Veterinary students. PES had greater utility, less complexity and moderate compatibility. It possessed good technicality, feasibility, designed in a user friendly and aesthetic manner and brought improvement in the user attributes. Both the groups were significantly differing on few items of applicability. The study concludes that PES is an IT enabled tool for faster dissemination of expert advice in multiple locations at the same time.

Key words : *Poultry Expert System; Veterinarians; Students; Design; Utility; Complexity; Technicality; Compatibility; Feasibility*

INTRODUCTION

Information and Communication Technologies (ICTs) are bringing significant changes to India, as elsewhere. Such ICTs can be exploited to design cost-effective systems to provide expert advice particularly to rural communities, helping increase productivity and livelihoods. (Swaminathan,2003). An Expert System, one such ICT, is an intelligent computer program that uses knowledge and inference procedures to solve problems difficult enough to require significant human expertise to solve (Feigenbaum, 1982). Expert Systems provide a framework for presenting the latest scientific knowledge and decision-making tools. Although Expert Systems have been developed in many agricultural science disciplines, such systems do not always adequately address the end user. The issues and challenges in the development of such systems include involving the user in development, building consensus between developer and user on the definition of usefulness, delivering computer based technologies and the challenges of implementing the system rather than its parts (Ostergard *et al* 1982). Poultry Expert System (PES) attempts to address these issues and was developed using Visual Basic 6.0 and MS Access on four dimensions of poultry farming i.e. diseases, biosecurity, summer management and drugs used. The present study was carried out to test its applicability among end users - veterinarians and veterinary students.

MATERIALS AND METHODS

Veterinarians of Nizamabad district and pre final year students of College of Veterinary Science, Hyderabad, Andhra Pradesh, India were selected randomly @ 30 respondents, representing each group. Poultry Expert System was demonstrated to the respondents by the investigator through a lap top computer. The respondents recorded their response on the interview schedule which had three point continuum i.e. agree, undecided and disagree. The applicability of Poultry Expert System was measured on 29 items, categorized into seven criteria - utility, complexity, compatibility, technicality, feasibility, design and user attributes.

Utility: Ability of PES to be more useful in taking poultry farming decisions, especially when experts are not available; result in saving of time, money and efforts.

Complexity: Denotes easiness in its operation, navigation and understanding of the content through simple language, compared to traditional way of using knowledge system.

Compatibility: The users' rationality in retrieving the knowledge and consequent decision making is indicated by the compatibility of the system, as the traditional system emphasizes more on consultation of the expert.

Technicality: Credibility and accuracy of the content reflects technicality. System with the content derived from experienced expert professional knowledge managers had high reliability and validity.

Feasibility: It is denotes end users adoptability of PES, in lieu of existing mechanism. Adoption Relies on attributes innovation attributes such as relative advantage, trialability, usability, affordability etc.

Design: Holistic presentation of the content; in a more user friendly manner with all the required and satisfy the end user while using.

User attributes: Manifestations of the end users' knowledge, attitude and skills (KSA). User attributes chiefly reflects the end users interest, attitude, confidence and ability to use effectively.
The data were subjected to statistical tests and Mann Whitney test was applied to identify significantly differing items between the two groups.

RESULTS AND DISCUSSIONS

The various items of the perceptions of practicing Veterinarians and Veterinary students on the applicability was categorized into 7 different criteria and presented in the following paragraphs.

Utility

Veterinarians and Veterinary students found the utility of Poultry Expert System (PES) (Table1) to a grater extent. The utility of PES expressed in terms of its usefulness in day to day poultry farming, handy to use the same and perceived it's advantageous over the traditional methods. However the two groups did not had the consensus as to its usefulness in saving the time and money (Chandrakandan *et al* 2003). Veterinary Students are in the traditional learning process and not experienced the work pressure of a Veterinarian in a government position. The multifarious activities of the Veterinarian and limited availability of time resulted in the significant difference as revealed by Mann Whitney test. Field Veterinarians require more such aids to manage their time effectively.

Table 1: *Responses of Veterinarians and Students on the Utility of Poultry Expert System*

Sl. No	Item	***Veterinarians*** n=30			**Students** n=30			**Mann Whitney Test U**
		Agree f	**Un decided f**	**Dis agree f**	**Agree F**	**Un decided f**	**Dis agree f**	
1)	Very much useful	30 (100.00)	---	---	27 (90.00)	---	3 (10.00)	405.00
2)	Handy to use	26 (86.66)	2 (6.66)	2 (6.67)	26 (86.67)	2 (6.67)	2 (6.66)	450.00
3)	Saves time and money	30 (100.00)	---	---	23 (76.67)	4 (13.33)	3 (10.00)	345.00**
4)	Advantageous over the traditional methods	30 (100.00)	---	---	28 (93.33)	2 (6.67)	--	420.00

(Figures in parenthesis indicate percentages)
* Significant at 5% level of significance
** Significant at 1% level of significance

PES established itself as a means of IT supported delivery system. It benefited the users of a traditional knowledge acquisition mode, who had limited time

Complexity

Simpler operation, easily understandable content language and navigation in real time use reveal the users attitude towards system's complexity. Except few responses, both students and veterinarians had favorable attitude towards PES (Rao *et al*, 1999). Hands on experience on computers and exposure to software by veterinarians had resulted in the significant differences on items of simple to operate and easy navigation. PES was a user-friendly device for majority of respondents.

Table 2: *Responses of Veterinarians and Students on the Complexity of Poultry Expert System*

Sl. No	Item	***Veterinarians*** n=30			**Students** n=30			**Mann Whitney Test U**
		Agree f	**Un decided f**	**Dis agree f**	**Agree f**	**Un decided f**	**Dis agree f**	
1)	Simple to operate	26 (86.66)	2 (6.66)	2 (6.67)	19 (63.33)	6 (20.00)	5 (16.67)	346.00*
2)	Simple language	25 (83.33)	5 (16.67)	---	24 (80.00)	5 (16.67)	1 (3.33)	432.00
3)	Easy navigation	27 (90.00)	3 (10.00)	--	18 (60.00)	10 (33.33)	2 6.67)	312.00**
4)	Simple to understand	29 (96.67)	1 (3.33)	---	30 (100.00)	---	---	435.00

f= frequency
(Figures in parenthesis indicate percentages)
* Significant at 5% level of significance
** Significant at 1% level of significance

Compatibility

A habituated traditional existing decision support system dominates the new system provided the later had the inherent advantages over the former. PES established itself as a supplementary aid to the existing practice (Table 3) among the three fourth respondents. Lack of real time use of PES by students and veterinarians resulted in skepticism over its efficacy in replacing and substitution of an expert, as the PES was demonstrated only once (Rao *et al*, 1999). The response pattern shall improve over time on repeated use as the content was generated by the experienced poultry scientists of Indian Nation Research Institutes. The reliability and validity of the content had high order of excellence.

Table 3: *Responses of Veterinarians and Students on the Compatibility of Poultry Expert System*

Sl. No	**Item**	***Veterinarians*** n=30			**Students** n=30			**Mann Whitney Test U**
		Agree f	**Un decided f**	**Dis agree f**	**Agree f**	**Un decided f**	Dis agree **f**	
1)	Replacement of an expert	9 (30.00)	15 (50.00)	6 (20.00)	11 (36.67)	9 (30.00)	10 (33.33)	432.00
2)	Supplement to the existing practice	23 (76.67)	7 (23.33)	---	22 (73.33)	7 (23.33)	1 (3.33)	431.50
3)	Substitution of an expert	12 (40.00)	11 (36.70)	7 (23.30)	13 (43.33)	9 (30.00)	8 (26.67)	447.50

f= frequency
(Figures in parenthesis indicate percentage)
* Significant at 5% level of significance
** Significant at 1% level of significance

PES can be utilized as a means of decision-making tool, in case of non-availability of an expert.

Technicality

Technical content incorporated into the system yield better adoptability and precision in the decision making. The content is obtained from the experienced experts of poultry farming which implies credibility of the source, accuracy of the content, agreement with human expertise and lack of discrepancy of the message (Somasekhar, 1999). Both Veterinarians and students endorsed the credibility of the content. Due to lack of judging capacity of the students; as they stand in the pre final year of study, led to difference in the perception on credibility (Table 4), as evidenced by Mann Whitney Test. Content had roots from strong knowledge base. Credibility of the source, accuracy of the content and experts' agreement with the end results strengthened the PES to be used widely in day-to-day activities.

Table 4: *Responses of Veterinarians and Students on the Technicality of Poultry Expert System*

Sl. No	*Item*	***Veterinarians*** n=30			**Students** n=30			**Mann Whitney Test U**
		Agree **f**	**Un decided f**	**Dis agree f**	**Agree f**	**Un decided f**	**Dis agree f**	
1)	Credibility	25 (83.33)	5 (16.67)	---	18 (60.00)	11 (36.67)	1 (3.33)	342.50*
2)	Accuracy	23 (76.67)	7 (23.33)	---	18 (60.00)	6 (20.00)	6 (20.00)	354.00
3)	In line with the agreement of experts	21 (70.00)	8 (26.67)	1 (3.33)	22 (73.33)	6 (20.00)	2 (6.67)	440.00
4)	No discrepancy in the message	20 (66.67)	7 (23.33)	3 (10.00)	17 (56.67)	8 (26.67)	5 (16.66)	399.50

f= frequency
(Figures in parenthesis indicate percentage)
* Significant at 5% level of significance
** Significant at 1% level of significance

Feasibility

Innovation with attributes such relative advantage, trialability, usability, affordability reflects in early continued adoption. Cost effective PES is a decision making tools which satisfied the information needs of farmers as voiced by Veterinarians (86.67%) and students (83.33%) (Table 5). Cost effectiveness is a prime factor of adoption of IT enabled innovations in animal husbandry, which the developer should consider. Due to non existence or non availability of expert systems in India in livestock sector, particularly poultry, Veterinarians (86.67%) and students (93.33%) perceived PES as a new aid of technology transfer, which can be used at farmer's level. Development of end user oriented PES resulted in better feasibility, which is not true in many instances. (Ostergard, 1992) In future, knowledge base expansion makes it a comprehensive extension delivery system.

Table 5: *Responses of Veterinarians and Students on the Feasibility of Poultry Expert System*

Sl. No	Item	*Veterinarians* n=30			Students n=30			Mann Whitney Test U
		Agree f	Un decided f	Dis agree f	Agree f	Un decided f	Dis agree f	
1)	Suitable to existing information needs of farmers	26 (86.67)	3 (10.00)	1 (3.33)	25 (83.33)	5 (16.67)	----	437.50
2)	Affordability / cost effective	20 (66.67)	6 (20.00)	4 (13.33)	13 (43.33)	8 (26.67)	9 (30.00)	334.00
3)	New aid for transfer of technology	26 (86.67)	3 (10.00)	1 (3.33)	28 (93.33)	1 (3.33)	1 (3.33)	421.00
4)	Can be used at farmers level	18 (60.00)	8 (26.67)	4 (13.33)	16 (53.33)	2 (6.67)	12 (40.00)	376.00

f= frequency
(Figures in parenthesis indicate percentage)
* Significant at 5% level of significance
** Significant at 1% level of significance

Design

PES was a user friendly design which is not so in many instances as the user was not adequately addressed in the development of the system (Table 6). Design aimed at user satisfaction results in better utility, as the user feels comfortable. User satisfaction is reflected by its aesthetic nature, user centered design and interactive ness, which are embedded in PES. User centered design ensured the users to identify themselves with the system which is developed for them only. User interactive ness of the PES satisfied the end users' basic instinct to interact, be the computer or human beings.

Table 6: *Responses of Veterinarians and Students on the Design of Poultry Expert System*

Sl. No	Item	*Veterinarians* n=30			Students n=30			Mann Whitney Test U
		Agree f	Un decided f	Dis agree f	Agree f	Un decided f	Dis agree f	
1)	User friendly	24 (80.00)	5 (16.67)	1 (3.33)	27 (90.00)	2 (6.67)	1 (3.33)	406.50
2)	Aesthetic	24 (80.00)	6 (20.00)	---	25 (83.33)	3 (10.00)	2 (6.67)	441.00
3)	User centered design	22 (73.33)	8 (26.67)	---	24 (80.00)	5 (16.67)	1 (3.33)	424.00
4)	User centered interactive ness	25 (83.33)	5 (16.67)	---	25 (83.33)	2 (6.67)	3 (10.00)	442.50

f= frequency
(Figures in parenthesis indicate percentage)
* Significant at 5% level of significance
** Significant at 1% level of significance

User attributes

Significant changes in the users' Knowledge, Attitude and Skills (KSA) are the consequences of an innovation, which provides the direction for future. Computer Training is one such requirement of most of Veterinarians and students of Veterinary profession (Table 7). Hard ware adjustments such as touch screen computer is one alternative to use PES effectively even without training. Improved self confidence is the positive outcome of PES, which always enhances its utility. User friendly design contributed for the same. PES enriched the users' capability of effective decision making, in the absence of experts, which is because of its content. The PES developed favorable attitude among Veterinarians and students.

Table 7: *Responses of Veterinarians and Students on the User attributes of Poultry Expert System*

Sl. No	Item	*Veterinarians* n=30			Students n=30			Mann Whitney Test U
		Agree f	Un decided f	Dis agree f	Agree f	Un decided f	Dis agree f	
1)	Requires training	29 (96.67)	1 (3.33)	---	26 (86.67)	4 (13.33)	---	405.00
2)	Self confidence is improved	26 (86.67)	4 (13.33)	---	22 73.33)	7 (23.33)	1 (3.33)	388.00
3)	Capable of taking decisions in the absence of expert	22 (73.33)	6 (20.00)	2 (6.67)	15 (50.00)	11 (36.67)	4 (13.30)	420.00
4)	Enhances the effectiveness of Decision making	27 (90.00)	2 (6.67)	1 (3.33)	24 (90.00)	3 (10.00)	3 (10.00)	344.00
5)	Creates interest	28 (93.33)	---	2 (6.67)	30 (100.00)	---	---	403.50
6)	Leads to favorable attitude towards Expert System	25 (83.33)	5 (16.67)	---	28 (93.33)	2 (6.67)	----	405.00

f= frequency
(Figures in parenthesis indicate percentage)
* Significant at 5% level of significance
** Significant at 1% level of significance

PES was an effective tool of extension advisory system as it boosted the self-confidence, which reflected in their capacity to take effective poultry farming decisions in the absence of experts and a favorable change in the attitude and interest of Veterinarians and students.

SUMMARY

Veterinarians and students strongly felt that Poultry Expert System is an effective tool in dissemination the expert advice on poultry farming. Derivation of content from the experienced poultry experts made the PES, a reliable tool of dissemination. Veterinarians and students' perceived equally all items except few significant items, which is due to variation in the experience, exposure of both groups. Exposure of PES to Veterinarians and Students further strengthened that PES is a user-friendly decision support system. Such decision support system / delivery system shall be developed on various aspects of livestock farming for faster dissemination of information in multiple locations at the same time.

REFERENCES

Chandrakandan, K., Karthikeyan, C. and Sebastin, S. (2003) "Experiments on computer based extension education to farmers" *Souvenir and abstracts of National Seminar on responding to changes and challenges: New roles of Agricultural Extension*, February 7-9, 2003, College of Agriculture, Nagpur pp 24

Feigenbaum, E. A. (1982) "Knowledge engineering for the 1980's". *Heuristic Programming project*, Computer Science Department. Stanford University, Stanford, California, USA.

Ostergard, M.M., Goodwell, P.B., Watson,D. G. (ed), Zazueta, F.S. (ed) and Bottcher, A. B. (1992) "Delivering expert systems to agriculture with CALEX / Cotton." Computers in Agriculture extension program. *Proceedings of 4th International conference*, 28-31, January 1992, Orlando, Florida. pp 676-681.

Rao,J.V.K. , Ramchander, P.R., Gowda, M.J.C. and Achalaparipurna, K. (1999) "Extension through expert systems - new vistas". *Journal of Extension Education* vol. 10, no. 4, pp 61-70.

Somasekhar, N. (1999) "CropCare .X10 , a model expert system for the diagnosis and management of crop pests and diseases". *Pest Management in Horticultural Eco Systems* vol. 5, no.1, pp 54-56.

Swaminathan, M.S. (2003) "A Knowledge revolution in rural India", *The Hindu*, 20th July,2003.