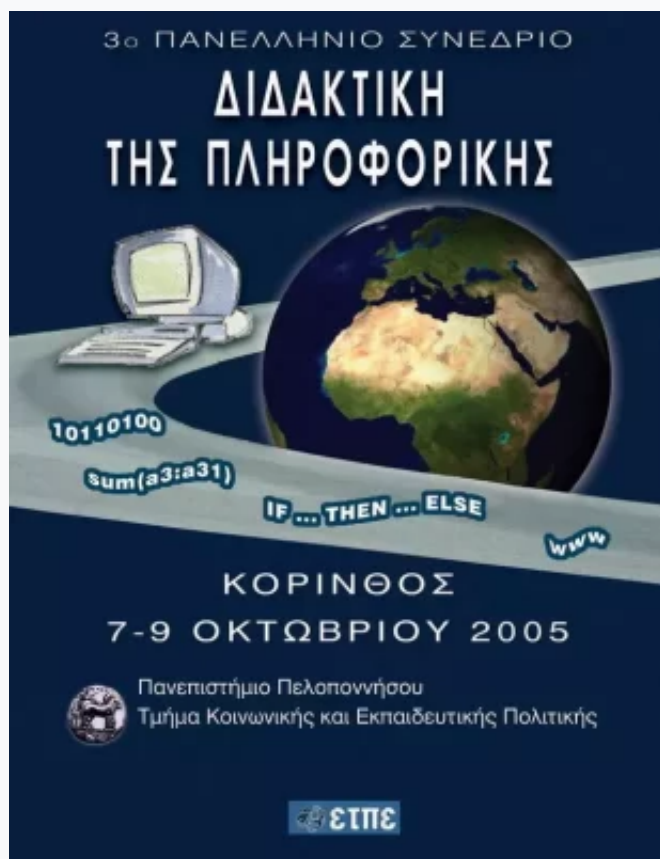# Συνέδρια της Ελληνικής Επιστημονικής Ένωσης Τεχνολογιών Πληροφορίας & Επικοινωνιών στην Εκπαίδευση

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ΕΤΠΕ

Training Teachers for New Roles in the New Era: Experiences from the United Arab Emirates ICT Program

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Βιβλιογραφική αναφορά:

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ABSTRACT

This paper presents a training model for empowering teachers for new roles, with particular reference to the United Arab Emirates (UAE) education system and society. Following a presentation and analysis of the UAE's current educational features, needs and visions, the results of a national teacher survey, with the participation of 2,500 teachers, and a review of past efforts and models for training teachers in the field of Information and Communication Technology (ICT) in the UAE, an alternative teacher training model has been advanced which was tried out. Evaluation results indicated considerable changes in teacher professional development that could significantly contribute to teaching and learning for a sustainable future.

KEY WORDS: *ICT, United Arab Emirates, Teacher training*

INTRODUCTION

At the threshold of the 21st century, the rapid evolution of information and communication technologies (ICT), their wide diffusion in the entire economy and their integration in nearly all aspects of everyday life have led towards what has been ascribed to as Information Society (IS). This type of society is contrasted with agricultural and industrial societies in terms of transformation of socio-economic structures and the view of technology as a transformative medium (Makrakis 1988). Technologies exert significant changes on work patterns, life-styles and modes of communication, creating the need for new skills, adaptability to change and flexible structures in employment. At the same time, the emphasis on knowledge and skills creates the need for continued life-long learning and imposes changes in the education and training systems. In the new era, people are required to be more critical and creative in thinking and decision making than in any other era in human history. The convergence of ICT and new pedagogy, as it is summarized in Table 1, marks a shift from "traditional" modes of instruction to a new current that is infused by new pedagogical ideas that could have enormous potential for educational innovation and reform.

Table 1: Traditional pedagogy versus new pedagogy supported by ICT

Traditional pedagogy	*New pedagogy supported by ICT*
Linear presentation	Hypermedia presentation
Receptive learning	Self-paced learning
High teacher control	High learner control
Limited resources	Unlimited and updated resources
Focus on what to learn	Focus on how to learn
School learner	Life-long learner
End-task assessment	Authentic assessment
Expository teaching/learning	Scaffolding teaching/learning
Uniperspective learning	Multiperspective learning
Monologic/Uncritical	Dialogic/Critical
Absolute truth/answers	Relative truth/answers
Focus on observable behavior	Focus on personal/social meaning
Directed goals/content	Negotiated goals/content
Learning by observing	Learning by doing/discovering

In the last two decades, traditional pedagogical methods have been heavily criticised for putting too much emphasis on the content being taught and too little emphasis on what learners bring in the classroom concerning this content. It does also happen, due to the rapidly expanding knowledge and the changes occurring at many levels, that some of the content might be outdated. In the old pedagogy, the primary goals of instruction focus on pre-specified content and learning objectives, in contrast to new pedagogy where the pre-specified content is not viewed as stable and unquestioned. What matters in this sense does not concern the end but the process towards the end. While traditional school learning has been increasingly disconnected from the kinds of learning situations that characterise activities and problems that learners encounter outside of school (Nagel 1996, Collins 1999, Makrakis & Kostoulas-Makrakis 2005), new pedagogy puts more emphasis on providing experiences in authentic versus decontextualized contexts, and cultivating learning processes versus learning outcomes (Choi Jeong-Im & Hannafin 1995). School learning in the context of new pedagogy focuses on procedures that advance emancipatory knowledge creation and understanding of meaning (O'Loughlin 1992). It also assumes that education is not confined into the notion of a place where knowledge is perceived from a single perspective and structured into rigid blocks in the curriculum, but a place where flexibility, self-direction, self-actualization, and reflection are highly valued. Traditionally, technology serves as a means to make pre-specified learning more effective without affecting the broader ends of education, in contrast to new pedagogy that serves to establish an open and flexible learning environment that may alter both the means and ends of education (Mean & Olson 1997).

In this context, teachers have to see themselves functioning as facilitators and mentors, as resource and technology coordinators and as curriculum developers (Makrakis 2002). Each of these roles is associated with specific activities and is enriched

by the use of technology. Teachers as "facilitators and mentors" will guide and facilitate students' critical and creative thinking in collaborative learning environments. Teachers as "resource and technology coordinators" will have to develop searching skills to their students and make use of multiple resources. The role of teachers as "curriculum developers" refers to the teacher, who critically assess school knowledge and reorders and enriches it according to the principles of new pedagogy supported by technology. Although, ICT can play a key role in this process by providing teachers with new tools that can transform and enrich instructional roles, curricula, and practices, ICT by itself is not likely to make much, if any, unless it is based on sound pedagogical principles. The impact of ICT on teachers' roles and student learning can also be achieved through well-educated and trained teachers able to determine ICT's ultimate instructional contribution and potential for educational change and reform (Makrakis 2001).

United Arab Emirates (UAE) is currently faced with this challenge, by undertaking a new reform wave, creating the appropriate circumstances for progress and growth within the IS. The 2004 Information Society Index (www.idc.com) placed the UAE as the 32nd out of 55 countries surveyed. These 55 countries accounted for 98% of all ICT infrastructures in 150 countries. The overall UAE strategy for the IS is based on the creation of an environment that is conducive to entrepreneurship and innovation, productivity and competitiveness and offering better services to citizens and firms, through the modernisation of the state operation, and the application of ICT in all social sectors. In this process, education is meant to play a key role in creating an educational system adapted to the technological age. The UAE leadership, the Ministry of Education and the Sheikh Mohammed bin Rashid Al Maktoum IT Project have taken significant steps towards driving UAE to the era of digital technology.

This paper presents a teacher training model for empowering teachers for new roles in the new era, with particular reference to the United Arab Emirates education system and society. Before presenting and analysing the teacher training model, it is necessary to analyze UAE's current educational features, needs and visions, under the headings of educational goals, the internal and the external environment of the school and the resources available to the school.

Educational Goals

The UAE Ministry of Education is increasingly convinced that technology is a central element of educational reform and innovation. The basic features of the education system as envisaged by current educational reform entitled as Education Vision2020 are in accordance with the new pedagogy principles discussed earlier. For example, it is clearly stated that "The school will not confine its role to transferring knowledge. It will go beyond this to prepare the learner for the future, teach him/her how to learn, work, live and co-exist with others…The teacher will be well qualified, self-committed to profession and ready to play new roles in the teaching process" (MoEY 2000, p. 63). It has been also cited that education should aim at "enhancing systematic thinking styles at the top of which is scientific, critical and creative thinking" as well as "Emphasizing

unity and integration of knowledge" (p.44). Cross-curricular development has been thus valued instead of perceiving curriculum development and instructional materials from a narrow and single school subject. Introducing new technology in designing, preparing and producing such type of instructional materials and curricula has been cited as a top educational goal. We can also identify several more educational goals underlining education, including educating and upbringing youth according to Islamic values, and education for citizenship affiliation and sustainable development.

Internal Environment

The internal environment is referring to the main school culture that includes learners, teachers, administrators and all the various subsystems and structures that make up the school. All the internal school environmental components must function in a way that make it possible to successfully carry out the educational goals and mandates described in the Education Vision2020 strategic plan. The question to be asked is: Does the present UAE internal school environment support the Education2020 Vision and the aspirations of the country's leadership?

In his address to educational officers and educationalists at the end of 2004, Sheikh Nahyan bin Mubarak Al Nahyan, Minister of Education, pledged to affect a genuine quantum leap in the education process. The Minister re-stated old concerns that a new educational approach, where the learner is at the centre of the educational process, must be affirmed. This will inevitably necessitate the implementation of new curriculum and teaching methods. As the Education Vision2020 document states, despite continuous reviewing and updating, the present school curricula have not been developed with respect to new objectives, content or methodologies. These curricula remain only cognitive in nature, dominated by the experience of the past. They only promote memorization and recitation skills of learners. Thus, learners have become passive in what they take and do not give, memorize and don't think (MoEY 2000). School curricula deprive learners of their right for self-learning, individualization and creativity. Repetition, redundancy and weak readability are further defects of the present school curricula. Added to that, "the supervisor plays the role of a detective and faultfinder…The school principal; sees himself/herself best in managing work" (MoEY 2000, p.35). The same document urges that teachers have to abandon teaching methods based on rote learning and behaviourism. Instead they should adopt more active, authentic and constructivist approaches to teaching and learning. ICT has to be then used for fostering such skills and as a means of delivering multimedia-based instructional materials (ibid.).

External Environment

The external environment includes systems outside individual schools, such as educational districts, communities, and the larger society. Education has been often criticized for isolating itself from the local and larger society. Community engagement during technology planning with new pedagogy is an essential part of building a

sustainable system. This engagement can extend to collaborations and consortia in which different organizations join together to undertake a larger cooperative effort. Education Vision2020 states that since the Ministry will be the user and beneficiary of the output of teacher education programs of the UAE Universities, a firm relationship must be established to allow the Ministry to specify the standards and criteria required for educating target teachers. This type of cooperation will not be limited to pre-service programs but will be expanded to cover in-service training programs so as to enhance and improve teaching competencies to realize the principles and concepts of continuous education (MoEY 2000).

It has been also stated (MoEY, 2000) that the central budget control and civil service regulations and procedures limit the Ministry's authority and management ability. Centralization of governmental performance does not allow for enough flexibility. It hinders not only innovation and creativity but also effective and efficient leadership and development. De-centralization, however, necessitates changes. Another fact is that priority has been given in the past to hardware access at the expense of teacher training and educational software development. If school authorities are not allocating sufficient resources for professional development- instead of putting almost all the budget into technology acquisition- schools will be left with the tools but not the human resources needed to drive UAE into the new era. The Minister of Education, Sheikh Nahyan bin Mubarak Al Nahyan, has several times pointed to the need of eliminating bureaucracy and centralization of decision making, solving financial constraints, giving priority to real needs and follow-up activities. All these demand an effective administrative system that is composed of well-qualified administrators in the field of human resource development and educational administration who recognize that UAE should move from (Makrakis 2002):

- A uni-resource to a multi-resource economy
- A uni-skilled to a multi/flexibly-skilled workforce
- A capital-based to a knowledge-based society
- An individualistic to a cooperative society
- A past/present to a future oriented school
- A centralized to a decentralized education system
- A textbook-oriented curriculum to a multi-resource curriculum
- A teacher-centered to a learner-centered curriculum.

DEVELOPING AN ALTERNATIVE TEACHER TRAINING MODEL

In the light of the above discussed features, needs and visions, the results of a national teacher survey, with the participation of 2,500 teachers (Makrakis 2002b), and a review of past efforts and models for training teachers in the field of ICT in the UAE, the following points have been revealed.

- It has been put much emphasis on the transfer of ICT skills and learning of specific software and applications, ignoring most of the new pedagogy principles.
- There has been little adjustment for learning styles, personal needs and the learning

context in which knowledge and skills will be applied and tried out.
- Teacher training models based on research, curriculum and assessment were lacking and training methodologies have mostly ignored adult learning principles.

In this narrow perspective of framing teacher professional development, issues concerning the integration of ICT into existing curricula, ICT-related changes in the curricula, changes in the teacher role and understanding learning theories were neglected or at best tackled marginally. The simplest and most common teacher professional development activities undertaken in the ICT area were those aiming to develop skills that qualify either students and/or teachers to ICDL certification. Although such skills constitute a basis for advancing to the educational aspects of technology, the over-emphasis placed on these skills that often turn to be perceived as panacea for education ills is wrong and misleading. Such kind of training experiences never result in any significant changes in teaching theory and practice. Any professional development attempt without connection to learning theories and practices as well as to curriculum and classroom applications add nothing to educational reform and change. Added to that, access to and use of ICT tools alone will not help a teacher who does not have a sound understanding of how students learn and how best to address students' needs and learning styles. It does not make sense, for example, to expect from a teacher to use a communication tool like the Internet to support cooperative learning without knowing the theory and practice behind cooperative learning (Dillenbourg & Schneider 1995). Technology is just a tool and not an end in itself. Thus, teachers' knowledge about ICT must go beyond mere ICT skills and the application of subject-specific software to the understanding of the processes. This implies not only technical aspects, but also the conceptual skills required of a teacher to integrate ICT in everyday educational practice. Indeed, the successful integration of ICT into the classroom depends to a large extent on teachers' attitudes towards innovation and change. This requires a fundamental and continuous process of rethinking what is taught, how it is taught and why. Effective use of technology often requires changes in the ways teachers teach. In many cases, this means that teachers embrace strategies for student-focused learning, such as tailoring instruction to meet individual students' learning needs, helping students develop problem solving and critical thinking skills and providing opportunities for project-based learning, especially adopting cross-curricular thematic units. Teachers need professional development experiences focused on these neglected issues and not solely on low-level ICT skills decontextualized from the learning environment.

Accordingly, an urgent need existed for an alternative teacher training model to turn teachers capable of infusing ICT into their classrooms. One such training model, shown in Figure 1, has been developed by the author and implemented at the Ministry of Education in the United Arab Emirates during the period 2002-2004. The model was based on the following principles:
- Significant learning takes place when the training material is relevant to society, the personal interests of the trainee and the classroom practice.

- Self-initiated learning is the most lasting and pervasive aspect to professional development. This means that: a) trainees should be encouraged to participate in the learning process and have control over its nature and direction and b) training is concerned with transformation and experience.
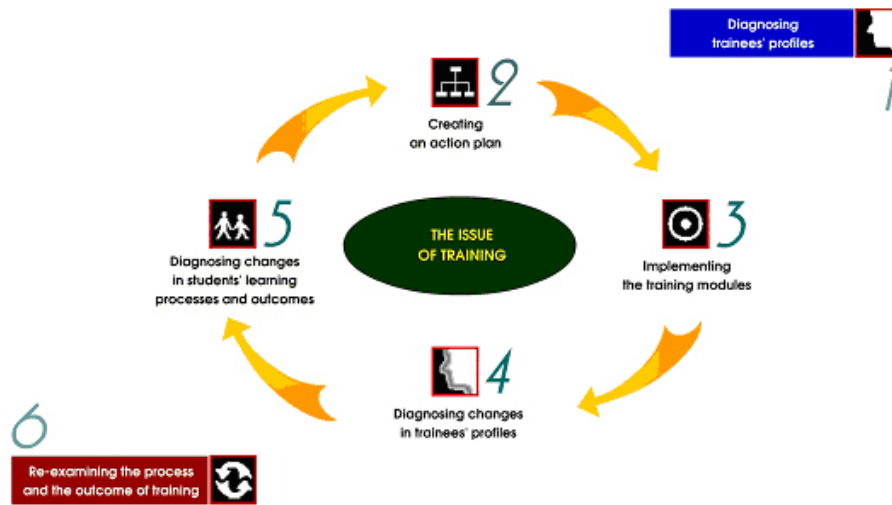

Figure 1: The Stages of the Alternative Professional Development Model on ICT

Constituencies of the Model

In the first stage, training focuses on the diagnosis of the didactic profile of every trainee. On the basis of the analysis of all trainees' profiles, an action plan for the specific training session is formulated (second stage). Following the action plan is the training content, which merges theory and practice and structured in thematic units, or modules that can be further enriched, considering the requirements and needs of the trainee (third stage). The evaluation of trainees' learning outcomes will be compared to their initial profiles and the aims and objectives set in the action plan (fourth stage). The same process of evaluation is continued for the final recipients, the learners as trainees transfer their acquired skills and knowledge to the classroom (fifth stage). A system of monitoring and upgrading is integrated across all stages that help to sustain the proper functioning and possible upgrading of the training process (sixth stage).

Interpretation of Constituent Stages

Diagnosing trainees' profiles

In all forms of adults' education, we must focus our interest on the trainee, and not the trainer. As a result, the individual characteristic, that is the profile of each trainee, is

necessary to be recorded. This kind of knowledge is important for the design, the development, the implementation and the evaluation of the training program. The trainee's profile usually includes his/her abilities, motives and expectations. Trainees' views, perceptions and experiences, regarding the domain of training, as well as their models of teaching and the pedagogical practices they implement in classroom are important to be recorded, processed, analyzed and interpreted.

Creating an action plan

In the previous stage, the activities were focused on the outline of the profile of the trainees. The analysis and interpretation of this information, in individual and group level, leads to the mapping of the needs, the educational practices, the perceptions and the experiences of the trainees. This information constitutes the basis for the creation of the action plan or a "learning contract" of this specific course of training. Learning contracts encourage independence by enabling trainees to negotiate their own needs for training with the trainer and together reaching an agreement about how and what is to be included and assessed. The contract can be written on a pro forma and includes the vision, the aims and the expected outcomes of the training, the methodology and the alternative strategies that ought to be adopted for the achievement of the expected outcomes. The trainee in this way becomes a partner in the process of training and not just an object of training. This process can also enhance trainees' motivation. It is important to provide trainees with the rationale they need for engaging in the intended training. It should also be apparent to the trainees that the training objectives are attainable. In other words, they have to understand on what they will be trained, be convinced that the objectives set can be reached with proper effort and that activities are directly linked to their needs. As pointed earlier, teachers have difficulty applying ICT skills in the classroom unless they are directly linked to learning and the curriculum.

Implementing the training

Implementation is concerned with training material, training methods and the training environment. The training material should match the needs of the target group, their interests and expectations. Training material and practice should also be developed and delivered in accordance to new pedagogy principles of training and learning, be relevant to the real world and reflect adult education training principles. It is important that trainers recognize the specific characteristics of teachers as adult learners and apply appropriate methods of training that underpin adult learning theories. A multiplier method of training could start with train-the-trainer, which can be carried out consequently according to the needs and then move to a school-based or bottom-up approach. It seems that such an approach reflects the urgent needs for teacher professional development, in terms of quantity and quality.

Diagnosing changes in the trainees' profiles

Assessment of the learning outcomes and the process of learning are very crucial, since only in this way, it will enable us to know the degree of the effectiveness of the methods, techniques, as well as the training material used. This assessment is primarily based on the initial profile of the trainees identified in the first stage of the training process. Accordingly, the same tools used in identifying the profiles of the trainees in the first stage can be appropriately modified and used again, in an effort to diagnose what changes have been occurred as a result of the specific training intervention. We can realize, for example, to what extent teachers' expectations were satisfied, if there are changes in the way they use new technologies, their teaching practices with new technologies or if their knowledge and skills in new technologies have changed. It is also important to evaluate, not only the expected, but also the unexpected results. This process can also be substantiated with multiple techniques, such as observation, diaries/portfolios, interviews and reflection. Both the trainer and the trainee must keep a diary, in which they describe any important changes and problems encountered, taking into consideration the initial profile and the action plan (learning contract) of the training program. It must also be noted that this process must be incorporated throughout the whole course of the training program.

Diagnosing changes in students

It is not only important to diagnose potential changes in the trainees' (teachers) initial profiles but also changes in students' learning and learning processes as well. Since the final recipients of the teacher training outcomes are the students, it is considerable to assess what changes are occurred at the student level, as well. Diagnosing changes in students' learning is very important and provides a good measure of the quality of the training provided. By inviting teachers and students to evaluate the impact of the training, teachers themselves develop the competence and confidence to try out and change. It is also important to give students some modest experience of co-learning with teacher trainees while designing and developing multimedia-based instructional units, as part of their training tasks. Students can become partners of the training process, either as participants in the design and the development of the multimedia instructional material and/or as receivers of the outcomes of training during class intervention. Trainees should be asked to experiment their newly acquired skills and knowledge in their classrooms, in order to reach their educational potential.

Re-examining the process of training

The monitoring and follow-up of a training programme is necessary for the qualitative control of it, despite that the resources are often too scarce to initiate follow-up of teachers who have attended training courses. Continuous needs assessment is extremely important in determining how a training program must be adjusted in order to meet the goals and priorities set. This process is important, because through this we can: 1) improve our performance as trainers and teachers; 2) evaluate effectiveness and

classroom change; and 3) suggest changes and/or additions to the content and the processes of the training programme. What we should mostly monitor in a training programme is the process through which, the trainer creates opportunities for learning and enrichment of the curriculum. The tools discussed in the second stage (diagnosing trainees' profile); in the fourth stage (diagnosing trainees profile changes) and in the fifth stage (diagnosing students' learning outcomes) constitute good indicators of monitoring the training programme. The use of external evaluators can be also included in that process.

DIAGNOSING CHANGES IN THE TRAINEES' PROFILES: SUMMARIZED RESULTS

In the period of January 2002- June 2004, training was organized in three phases:
1st Phase   Train-the Trainer   (First cohort of trainers)
2nd Phase   Train-the-Trainer (Second cohort of trainers)
3rd Phase   Train Subject Teachers

First and Second Phases: Train-the-Trainer

In the First Phase, 30 teachers (IT supervisors and best IT teachers) were trained as trainers. The first cohort of trainers received about 200 hours during a period of four months (September-December 2002), spread in the following six modules:

1. Functional literacy in 21st century
2. Theories of learning and new technologies
3. Didactic strategies and new technologies
4. Teachers and students as multimedia authors
5. Teachers as evaluators of educational software
6. Teachers as designers of ICT school-based training.

The first cohort of trainers trained 600 IT teachers and computer knowledgeable teachers in the Second Phase (May-June 2003). Training in the second cohort amounted to about 130 training hours spread in the same training modules as in the first phase. An evaluation study using a multi-method approach was carried out to identify possible changes in teachers' profiles as a result of their training experiences. As indicated in Table 1, the mean score of teachers (n=594) before starting the training course was 2.1 (below the average), while after the course, the mean score reached up to 4 (much above the average). In general, these results are remarkable, taking into consideration the constraints under which the course of the second cohort of train-the-trainers was implemented. These results, however, need to be carefully interpreted. First, we should not rush to claim that the teachers trained are fully-ready to perform their roles as trainers. Such a claim may reduce their potential to contribute in educational reform and innovation. Training is a life-long process, and as such, it is perceived as a process rather than a product, which implies continuous professional development, especially on-the-job. To this end, during the implementation of the 1st and 2nd levels of the Third Phase, guidelines were developed to guide those who will function as teacher trainers.

Table 2: Pre and post training results

Items	Average Score (1-5)*	
	Before Training	**After Training**
Organize a lesson with the use of technology	2.8	4.2
Develop multimedia instructional material according to pedagogical principles	2.1	4.2
Apply learning principles in the evaluation of educational software	1.9	3.9
Teach a lesson with ICT using a cross-thematic approach	1.6	4.0
Identify the relation of different theories of leaning with the use of ICT	1.6	3.7
Develop plans to train other teachers in ICT	2.0	3.8
Produce training material for training others	2.3	3.8
Apply didactic strategies in teaching with ICT	1.9	3.7
Apply methods of adult education in teacher training	2.3	3.9
Discuss social issues related to ICT	2.2	4.0
Use ICT for creative thinking and problem solving	1.9	3.8
Integrate ICT across the curriculum	2.2	4.0
Develop a lesson plan	2.6	4.3
Total Average Score	**2.1**	**4.0**

*1= Not able; 2= Can do little; 3= Can do; 4= Quite good; 5= Very good

Despite the expressed caution to quantitative evaluation results, changes can be better noticed in the works done during the training process. The teachers trained as trainers in the Second Phase developed 130 multimedia instructional projects using various types of software tools, such as Flash, PowerPoint, Swich2, FrontPage and Visual Basic. Some teachers planned small instructional units, while others had planned more extensive interdisciplinary, project-based units. An example of these works is presented in Table 3. All teachers worked in teams that crossed inter-disciplinarity and grade levels. As pointed earlier, the ultimate goal of these assignments was not targeted to the product, but to the process.

Table 3: An example of some of the multimedia instructional projects developed by trainees in the second phase of train-the-trainer session

Title of the Project	Subject Area(s)	Grade Level
Electrical Consumption and Conservation	Geography, Science, Religion	Primary (1-3)
Heat and Environment	Geography and Physics	Lower Secondary
The Weather in U.A.E.	Science, Math, Arabic	Primary (1-3)
Drugs	Science, Health, Religion	Lower Secondary
Recycling the Waste	Chemistry, Geography, Environment	Upper Secondary
The U.A.E. Occupied Islands	History, Geography	Lower Secondary
The Four Seasons	Science, Geography, Religion	Lower Secondary
Universe and Solar System	Science, Geography, Geology, Religion	Lower Secondary
Stars of the Earth	Geography, Science, Religion, Arabic	Lower Secondary
Prayers	Religion, math, science, Arabic	Primary (1-3)
Wild mammals in UAE	Science, Geography, Religion, Arabic	Primary (5)
Garbo Dioxide Emission and Air Pollution	Science, Environment, Writing and Geography	Lower Secondary
Sea Pollution	Science, Geography, Economy, Social Studies	Upper Secondary
Planting Trees in UAE	Geography, Science, Religion	Lower Secondary
Mathematical Concepts	Numbers	KG (1-2)
Respiratory System	Biology	Upper Secondary
Kids English	English	Primary
Number, Colours & Shapes	Math, History, Culture	KG (1-2)
Temperature	Physics, Chemistry, Geography	Upper Secondary
Lunar Eclipse	Religion, Sciences, Geography	Lower Secondary
U.A.E.	Social studies, History, Geography	Lower Secondary
Light	Sciences, Arabic, Religion, Art	Primary

The 130 multimedia projects developed by teams of trainees can be fallen in three categories:

1. Multimedia projects that further enrich instructional units or themes from the curriculum of all educational levels, starting from kindergarten up to secondary education.
2. Multimedia projects that integrate new themes across the curriculum related to local history, and current social issues related to the environment, drug addiction and health.

3. Multimedia projects that can fully support new subjects such as the introduction of Web-page development, Access and Visual Basic in upper secondary schools.

Besides the learning outcomes gained by teachers while developing these projects, they can also be seen as: 1) good examples of curriculum innovation and evidence of the changing roles of teachers; 2) useful teaching resource for other teachers; and 3) resources to be used for modeling similar developments in the subsequent training efforts, at various levels and stages. By working on their projects, trained teachers were inherently encouraged or motivated to use ICT tools for information access, organization and processing, as well as to focus on epistemology, pedagogy and constructing new knowledge by applying collaborative learning and constructivist principles of learning. It is interested to point out that in a number of cases, teachers formed groups to discuss issues concerning constructivism and active learning theories. It is worth pointing out, that one group developed a multimedia project about constructivism and its teaching and learning implications posted online.

Third Phase
In the Third Phase, training was initially divided into three stages that were ultimately merged into two: the first stage was targeted to all teachers that had no knowledge on ICT and the second to those teachers that possessed basic ICT skills. The goal was to turn teachers able to integrate ICT into teaching and learning processes. Training in the Third Phase was carried out by those trained in the second cohort of trainers, while those trained in the first cohort acted as coordinators. In the 1st stage of the Third Phase, 3,410 teachers were trained, while in the 2nd stage, the number reached to about 1,000. The total number of teachers in the public school sector of the UAE is about 24,000 teachers, to whom training was targeted. If the needed infrastructure (e.g. computer hardware in primary schools and Internet networking) was available when needed as well as efficient and effective administrative support, the vision to cover all education levels could be possible within the period 2002-2004. Due to these barriers only schools which provided: a) at least one computer lab with standard computer equipment; b) Internet connection and c) at least a qualified teacher trainer, were eligible for participation in the 2nd stage of the Third Phase training. So far, no evaluation results are available to assess the transfer of skills and concepts acquired at the classroom level on those trained in the third phase.

Introducing the Innovation of ICT School Resource Teachers
In the period of September 2004 to February 2005, a new activity specifically designed for primary school teachers was introduced. This refers to the innovation of ICT School Resource Teacher that extends a previous research carried out by the author in Sweden (Makrakis 1991). These are ordinary teachers, who besides their teaching duties they will play a leading role in establishing "teacher learning communities" in their own schools, working either on a volunteer basis or through assigned work. The concept of ICT School Resource Teachers is based on the assumption that to carry out

any innovation in teaching and learning there is need of teachers who: 1) can provide good examples to other teachers; 2) act as educational leaders in their schools; and 3) are sensitized on sharing and giving. This is also in line, with the belief that: a) there is no way to advance any innovative practice in schools, unless it is developed and spread from the bottom up or inside and b) educational leadership should not be only confined to administrative personnel. Taking also into consideration that a bottom-up approach to teacher training implies that teachers have spare time to devote for their professional development, a Web-based open-distance training support system has been developed to cope with this problem. The Web-based system developed can provide almost 60% of the ICT School Resource Teachers training program, which amounts in total to 130 training hours, spread in the following five areas.

1. Information and Communication Technology Skills
2. Curriculum Applications, Integration and ICT
3. Classroom Planning, Management and ICT
4. Whole School Planning and Training on ICT
5. Education for Sustainable Development and ICT

The core educational concept upon which ICT School Resource Teachers' training program is developed, as well as of all previous training activities concerns the issue of teaching and learning for a sustainable future. Safeguarding environment is a national duty, and that sustainable development is focus of UAE policy, said H.H. Sheikh Khalifa Bin Zayed Al Nahyan, President of the UAE, on the occasion of the 8th National Environment Day, in 2005. Sustainable development was also one of the strongest principles of the late President Sheikh Zayed. Indeed, there is need of a major shift in the thinking, values, and actions of all individuals and institutions in their relationship with the natural environment. Sustainability should also be integrated across the school curriculum and teaching methods. A closer examination of the multimedia projects developed by the second cohort of teachers trained as trainers as well as the educational scenarios that could be turned into multimedia projects in the third phase one can identify that most of these projects are directly connected to themes of education for sustainable development.

The advancement of this innovative concept has been also based on the results of a national principals' survey addressed to all primary schools. Through that survey, around 1,200 primary school teachers identified as computer literates were selected to be prepared to function as ICT School Resource Teachers. Among them 100 were selected to function as training assistants. They participated in a workshop in order to be accustomed to the online Web system, the training philosophy and the content to be delivered online. About 60 of them have been further selected to assist in the training of teachers identified as prospective ICT School Resource Teachers. The goal was to have at least 1-3 ICT School Resource Teachers in every primary school, depending on the size. It was suggested to the Minister of Education, that if this innovation works, then those teachers who would play effectively this role, they will be rewarded by reducing

the amount of their normal teaching by 30%, in order to cope with their new roles. This innovation is still to be fulfilled, in that it requires the preparation of the needed infrastructure in terms of computer hardware, internet connection and administrative support.

EPILOGUE

Any educational innovation requires teachers to confront their beliefs about learning and the effectiveness of different tools, methods and instructional activities. Beyond the needed infrastructure for implementing any teacher training in the area of ICT, methods of professional development must focus on learning how to integrate technology across the curriculum, instead on learning about technology decontextualized from the learning environment. The training innovations described here aimed at:

- Empowering teachers to develop their instructional skills actively and experientially, in a variety of learning environments, both individually and collaboratively.
- Providing an authentic learning environment so that teachers engage in concrete tasks that merge school learning with society.
- Emphasizing the transformative role of teachers and learning and the ways that technology can provide the means to achieve the expected ends.
- Encouraging teachers to be mentors, tutors and guides of the students' learning process rather than simple presenters of information and knowledge.
- Developing teachers' skills in learning how to learn instead of what to learn and transferring the same skills to their students by engaging them in active learning methods and inquiry-based processes.
- Encouraging teachers to work in contextualized learning environments that support risk taking and experimentation.
- Providing opportunities for collegial sharing and ongoing professional development.

As one tool among others, ICT cannot be expected to change bad teaching into good. In fact, it can make good teaching better or bad teaching worse. The evaluation results presented here show us that learning and curriculum should be matched with technology. This was the major strength of the training philosophy underpinned in this teacher training model.

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