

## 16

# A knowledge based model of a networked teachers' training centre for in-service training with information and communication technology

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### **Abstract**

This article suggests a philosophical framework for an Israeli model of a computerised Networked Teachers' Training Centre (NTTC). It describes a community model being developed by a local community and the Education Ministry of Israel. The article clarifies the mission statement of the NTTC. It delineates what is being done in training three groups of teachers in three disciplines: science, mathematics and literacy through a rich Information and Communication Technology (ICT) environment. It provides an evaluation of this initial phase and draws the multidisciplinary approach of the centre for a communal curriculum development as its second phase.

### **Keywords**

Teacher education, information technology, knowledge based

## 1 INTRODUCTION

The committee for scientific technological education recommended in its report (Harari, 1992) to the Israeli Ministry of Education to establish regional support centres for the study of mathematics, science, and information and communication technology (ICT). These centres would be set up by subject areas, and would be equipped with all the necessary means of communication - computer communication and other audio-visual means - in order to assist teachers in their developing needs.

The 'Tomorrow 98' staff, which was set up in the Ministry of Education to realise the Harari Committee recommendations, published a list of principles and goals and called upon local communities to suggest programmes and 'creeds' for regional teachers' centres on the basis of the committee's recommendations. The staff called

on them to propose programmes for co-operation between the staff and interested municipal forces.

Following the manifesto of the 'Tomorrow 98' staff the education department of the Ramat Hasharon city initiated an educational program for a networked community teachers' centre. This article describes the goals and mission of the centre as drafted by the steering committee in co-operation with the local authorities and the 'Tomorrow 98' staff. It clarifies the philosophical basis and community 'creed' for the goals defined, and reports on the results of the evaluation of Stage 1 of the project.

## 2 KNOWLEDGE BASED TEACHERS' CENTRE

It is customary to refer to the present era as 'The Information Age'. However, there are those who claim (Harkins, 1992; Perelman, 1993) that we are entering a different era - the Knowledge Age. It is not sufficient, in the Knowledge Age, just to have skills and training for accessibility to information in order to have an advantage over others. The Knowledge Age argues for the need for skills to achieve a successful application of information in real time. Those who possess skills for gathering information in real time, analysing it, classifying it, and organising it with new meaning are the ones who will acquire social, cultural, and economic advantages.

In previous generations the isolated elite had to handle information that was voluminous and complicated in order to direct the efforts of people to improve their living conditions. These efforts took place in relatively small communities. In the Knowledge Age, on the other hand, information in imaginary amounts can be available to many who will compete globally in its use. In order for human society to succeed in directing its efforts and improving living conditions efficiently it will need a considerable number of students, citizens, and thinkers who will make their contribution such that they will be able to contribute additional human, ethnic, and special cultural value to existing information (Passig, 1995).

In order to train teachers to manage an educational environment which will enable converting information to knowledge, it is only natural to set up a supportive environment that will enable teachers to train themselves and to try out the learning processes which transform information to knowledge. We must do more than just build a supportive environment for teachers which trains them mainly to access and deal with information, as is being done in Europe (Veen 1995; Bruce, 1995) and in the USA (Welch, 1995).

## 3 THE MISSION OF THE RAMAT HASHARON NTTCC

The mission was formulated as follows:

"The networked centre for teachers in Ramat Hasharon will work on developing innovative skills and talents for teaching in computerised work environments in professional and multifarious fields of knowledge.

The centre will train the teachers of the community to integrate the use of information resources in the processes of teaching/learning, to assemble collections of computerised learning materials for colleagues in the community, and to develop community information resources on special subjects.

The networking system that the centre will operate will enable access to materials and discussions between groups of colleagues.

The centre will develop and accompany leading teachers who will serve as agents of change for teaching in computerised environments in the schools of the community. The areas of knowledge in the centre are: sciences, mathematics, literacy, and ICT."

The Networked Teachers' Training Centre was established during the first three months of setting up the project (September-December 1995). The regional networks known as BBS are more suitable to defined professional communities. They are separate from world networks, such as Internet, which are connected to millions of users with access certification all over the world. The regional networks are intended for a more limited number of users for designated purposes. They offer quicker, more economical and more efficient services which can be independently run according to predefined needs. Therefore, they are especially suited for educational needs.

#### 4 TRAINING ARRANGEMENT

Since the Ramat Hasharon support centre aspires to train the educational community for the construction of knowledge and information, and since the accord of teacher colleagues supports the process of knowledge construction, the training of teachers in the centre itself was put into the declaration of goals.

In Stage 1, 41 teachers are taking advanced study courses in frameworks of 240 hours, six instructors in various fields, and a steering committee. The steering committee consists of an academic advisor, the project manager (director of the education department of the Ramat Hasharon Council), a pedagogical co-ordinator, and five subject area heads. All of them, 55 in all, were equipped with colour computer notebooks loaded with various software packages and communication tools. The teachers were encouraged to take the computers home and use them for their personal needs too. The teachers in Stage 1 were chosen from elementary and junior high schools. In Stage 2 (academic year 1996-7) the NTTC will include high school and kindergarten teachers. In Stage 1 the centre is open one day a week. In Stage 2 the centre will extend its operation for additional days in accordance with the number of participant teachers.

**Table 1** Stage 1 Participants

<i>Field</i>	<i>Instructors teachers</i>	<i>Elementary teachers</i>	<i>Junior high teachers</i>	<i>Total</i>	<i>Hours</i>
Mathematics	2	8	8	16	240
Literacy	2	9	6	15	240
Sciences	2	6	9	15	240

The teachers participating in Stage 1 were chosen from fields of knowledge which were recommended by the Harari Committee and those being taught in the schools - sciences, mathematics, literacy, and ICT. The training of teachers in new learning methods and materials in each field was turned over to national leaders developing modern teaching materials.

## **4.1 Mathematics**

The advanced study courses in mathematics were taught by the mathematics staff of the Weizmann Institute headed by Dr. Rina Hershkovitz and Dr. Alex Friedlander. The courses focused on a number of topics.

Elementary school teachers - use of calculators and computers on the basis of a deeper understanding of mathematics; another view of mathematics as a profession composed of authentic problems; geometry teaching methods in combination with varied means and graded applied problems.

Junior high school teachers - Learning methods with interactive ICT; organising the learning process in a computer integrated classroom; alternative ways of evaluation in teaching mathematics with ICT.

## **4.2 Sciences**

The advanced study courses in the sciences were conducted by Dr. Sarah Klachko. The courses focused on a number of topics.

New materials - deepening the knowledge of the teachers in two subjects in the sciences - ecology and energy.

Continuity of learning - building a continuity of learning from the elementary to the junior high schools with the two chosen subjects.

Preparation of learning materials - preparation of activities in the chosen subjects and setting them up in the network.

## **4.3 Literacy**

The advanced study courses in literacy were conducted by the literacy staff of the centre for literacy in Levinsky College, headed by Dr. Hanna Ezer. The courses focused on two topics.

Literacy teachers - deepening the knowledge of the teachers in the didactic field of literacy and exposure to computer applications in teaching literacy; special emphasis was placed on the formation of the concept of their function as literacy advisers to teachers in various subjects.

The teachers in general - in the plenary meetings all the teachers studying in Stage 1 were exposed to theoretical and practical problems in literacy and ICT; all the teachers also received training in a variety of computer applications - word processing, information retrieval programs, computer communication, and multimedia tools.

# **5 EVALUATION**

## **5.1 First questionnaire**

A first evaluation procedure was conducted at the first meeting with the teachers before beginning any activity in the centre. Forty-one teachers participated and filled out a two-part questionnaire. In the first part there were 19 closed questions

concerning their willingness to accept changes at personal and school levels, their readiness to learn how to use new pedagogical tools, and their positions concerning computers and computer communication. In the second part the teachers were asked to indicate those things which, in their opinion, teachers need today in order to successfully perform their function.

At first we analysed factors in order to put together the questions which examined the same world of content. In this analysis we found four factors which satisfied the criterion Eigen value > 1. These factors are:

- The attitude of the teachers towards computers. This factor explained 22.9% of the variation.
- The apprehension of the teacher about teaching with the aid of computers. This factor explained 12.7% of the variation.
- The teacher's readiness for changes. This factor explained 11.5% of the variation.
- The attitude of the teacher towards the need to use new pedagogical tools in their work. This factor explained 9.0% of the variation.

At the second stage we have calculated the internal reliability coefficients (Kronbach alpha) for all four factors. Factor 1 - 0.90, Factor 2 - 0.68, Factor 3 - 0.67, and Factor 4 - 0.54.

Clearly, the internal reliability of the first factor is the highest, that of the second and third factors is reasonable, and that of the fourth factor is low (a partial explanation for this may lie in the small sample number).

The possibility of a linear connection between the four factors was examined. It was found, according to the Pearson correlations which were calculated, that the lower the teacher's apprehension for working with computers the more positive his or her attitude to computerised communication was ( $r = -0.27$ ,  $p < 0.05$ ). Also, the more the teacher reported a stronger aptitude towards new pedagogical tools and to adapt to them, the more positive was their attitude towards computers ( $r = 0.37$ ,  $p < 0.01$ ).

## **5.2 Second questionnaire**

Three months after the beginning of the activity in the centre, the teachers were asked to fill out a second questionnaire. The questions examined various aspects of the project (satisfaction on the part of the various professions, atmosphere during the lessons, motivation, and involvement), and the criteria for success as defined by the steering committee (understanding of the connection between the professional and the interdisciplinary parts, introduction of changes into teaching, mastery of computer applications).

The answers clearly indicate that the teachers attended cheerfully and were motivated to learn (97%), and that the material studied was relevant to the level of their school classes (87%). All the teachers (100%) felt that the instructors were professional, that they were committed to the success of the project, that there was a positive atmosphere, and that there was co-operation in the lessons.

A significant part of the group (85%) indicated that they saw changes in their work as teachers following their participation in the project, and that the training instilled a desire in them to read and study by themselves. There were no significant differences in the responses of the elementary school teachers and the junior high school teachers.

The purpose of this questionnaire was to follow up the effect of the project on the work of the teachers. We expected that the more the project advanced the greater the percentage of teachers who would report on the influence of the materials learned on their work in the classroom. It seems that already at this stage of the training (three months from the outset) at least a third of the teachers participating felt that there was an effect on their work. Particularly salient were the effects on their ways of thinking in preparing lessons (61%), on the technical possibilities that were available to them (61%), on understanding the needs of the students (70%), on the form in which material was transmitted in the lesson (54%), and on the integration of the computer in the work (67%).

## 6 CORRELATION

After analysing the second questionnaire, we set up Pearson correlations in order to examine whether there was a linear connection between the teachers' answers at this stage and their answers to the first questionnaire (which was given out before the beginning of the training).

The results show that just as the teachers reported in the first questionnaire a more positive attitude towards computers and computer communication, so they reported after three months that they are attending classes cheerfully and are motivated to learn (0.60=R), that they are satisfied with the lessons on the computer (0.50=R), and that they feel involved in the learning process (0.66=R).

Three months after the beginning of the year long training the teachers reported that the training already had an effect on their work by enabling them to communicate better with their students (0.61=R), by enabling them to work with other teachers (0.41=R), and to understand better the subject being studied (0.42=R).

The results showed that just as the teachers revealed in the first questionnaire a greater readiness for change at the personal and school level, so they reported after three months that they saw changes in their work as teachers (0.49=R), that the instructors showed a complete commitment to the success of the project (0.68=R), that the training had already had an effect on their work in their way of thinking when preparing lessons (0.53=R), in relating the material with other materials (0.60=R), and in better understanding the needs of their students (0.45=R).

From these correlations it can be clearly inferred that the teachers after three months had already developed positive attitudes to computers and computer communication and a readiness for changes in their personal and school level. They indicate that the teachers were greatly satisfied with the training set-up on a community model of a teachers' centre and in a technologically rich environment. The correlations also indicate advantages of the community model as a factor which generates a quite rapid effect on the teacher's classroom work.

## 7 GOALS FOR A SECOND STAGE

National projects of information resources for teachers on the model of "Science Community" (<http://www.lamda.org.il>) and international projects like Teacher's Online, which supply daily lesson systems to teachers in various fields of knowledge

(<http://www.southwind.net>) answer principally the need to give teachers access to updated resources of materials in the subjects they are teaching. However, the model of the community teachers' centre, which we are reporting here, set for itself a more developed goal. Since we identified the developing tendency in modern society, characterised by a Knowledge Based Environment, we set a goal to design an environment in which the teachers in the community would be trained to derive knowledge from information. We believe that we are transgressing reality if we should settle for a design of a support environment for teachers that just prepared them mainly to access, to deal with and to extract information.

For this purpose the steering committee of the centre met towards the end of Stage 1 and framed the following goals for Stage 2.

1. Interdisciplinary and multidisciplinary training.
2. Extending the activity to kindergarten and high school teachers, school principals, and students.
3. Expanding the activity - from local community activity to functional regional activity.

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## 9 BIOGRAPHY

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