THE MEANINGFUL USE OF TECHNOLOGY IN ADULT EDUCATION IN A RURAL SETTING:

Results of the Pilot Application of a Model

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Abstract:
Taking into account the massive installation of technological centers in marginal communities in Mexico's adult education system, the starting point for this article is the disintegration of technology, learning and rural problems. A description is provided of a model for the meaningful use of technology and real access for young people, adults and natural groups, assuming a constructivist sociocultural posture and principles of popular education. Emphasis is placed on the empirical results of the pilot application of the methodological strategy of the model, at four "community plazas", through active research and qualitative techniques of recording experiences. The article describes and discusses three trends for applying technology that were generated by 103 participants for developing relevant life projects; their relation with expected objectives; and some emergent findings.

Key words: information technologies, adult education, rural setting, cognitive processes, problem solving, Mexico.

Introduction

The utilization of new information and communication technologies (ICT) to support the education and fair development pursued by most Third World countries, has become an imperative of public policies for governments. In the case of Mexico, in 2000, the country implemented inter-sectorial action of wide scope, known as "e-México", to use ICT on diverse fronts and with multiples purposes: education, health, employment, trade, and electronic government.

Background

In terms of education for young people and adults without basic studies, the most outstanding initiative in relation to ICT is the installation of more than two thousand "community plazas" throughout Mexico, a project currently operated by Mexico's National Institute for Adult Education (INEA).[1] These plazas are physical spaces equipped with computers and connections, in addition to other media and teaching materials (blackboards, videos, bibliographic material, software, satellite television programs), generally located in rural or poor urban communities. The plazas are expected to contribute to the coverage of INEA programs (literacy, elementary and secondary) while closing the so-called "digital divide" by offering access to these technologies to people with limited

resources. The plaza's functioning is the responsibility of a promoter and a technician (computer technician), in addition to the teachers of adult educations, called "advisors".

This unprecedented effort coincides with the generalization of the new model for educating young people and adults: the model of Education for Life and Work (MEVyT), which has a curriculum not based on subjects but on modules of relevant topics for the student (UNESCO, 2004).[2]

Definition of the Problem

The expectation of the community plaza project was for the plazas to provide access to new technology, and thus support the coverage of MEVyT. However, according to the organizations in charge, the project began without a clear conception of the ways to integrate ICT into education. The attempt was made to articulate MEVyT, which had been developed carefully over several years, with technological innovation that had appeared in a more or less inopportune manner. On the other hand was the intention to provide access to the benefits of ICT to people not enrolled in INEA programs; yet no methodological proposal existed to reach this end.

Diverse programs around the world have faced similar situations, in which major investments are made in technology without clear, realistic proposals or adequate planning (ONU, 2003). Political/administrative decisions have not always considered the structural, cultural and contextual factors that affect the use of ICT as a means—rather than an end—for learning and developing thinking skills (Hewitt, 2001; Salinas *et al.*, 2004).

In 2002, the Research Group on Information and Communication Technologies for Education and Social Development (from Universidad de las Américas, Puebla) began, on the INEA's request, a project that would contribute to constructing the educational proposal for community plazas "right away".[3] As the basis for developing the proposal, the Research Group considered indispensable the preparation of a diagnosis of the initial plazas, in order to determine the perceptions and phenomena triggered by the technology. The diagnosis, carried out in 2002 and 2003, showed the clear separation between the adult learning process and ICT; the exclusion of adults from the computer area, which was occupied mainly by children and young people; the superimposition of technological innovation on a preexisting system; a strong trend toward schooling with schedules and classes; erratic utilization of ICT; and the limited educational function, restricted to accessing digitalized content or reviewing.[4]

Justification

The specialized literature and experience show that simply introducing technology is insufficient for attaining the expected results. Progressing to a society of information consists not only of increasing connectivity and access, but also of passing through a process of "computer literacy" that includes the development of cognitive skills for locating, evaluating, and utilizing the required information (Delors, 1996; OECD Secretariat, 2000).

In the U.S. study on computers in adult literacy and basic education, a generalized trend has been to measure the effectiveness of computers through experimental studies. In a broad review of the literature spanning the 1982-2000 period, Berger (2001) concluded that the results are inconsistent and that the only clear finding is that computers improve adults' performance with higher reading levels. This author underlines the need to carry out qualitative studies to permit *comprehending* the challenges and new processes faced by educators and adults with the addition of computers. The results of the current study hope to contribute to this line of exploration.

In 2003 and 2004, the Research Group started the task of designing an educational model that would permit integrating the use of ICT in lifelong education and the work proposed by INEA. The attempt would be made for young people and adults to use computers as tools by solving a problem they found relevant, without spending time on technical training in computers. Such an approach would favor the inclusion of people who do not show an interest in technology for technology's sake.

The purpose of this article is to describe the design and the pilot application of a model for integrating technology into adult education, with emphasis on the significant uses for a wide range of social subjects in a rural setting. Based on this description, an analysis is made of the relation with some of the model's aims, and emerging findings are discussed.

Specific Objectives
The first objective of this project is to present the methodological strategies and foundation of the model for integrating Information and Communication Technologies into Education for Young People and Adults (TEJA); in second place, to describe the results of the pilot application of the model in four rural communities, through cases that show various meaningful uses of technology linked to projects, while analyzing the cases in relation to the model's ends; and lastly, to describe briefly the application of the model's methodological strategy in the field, and discuss its pedagogical implications.

It is necessary to clarify that the institutional and contextual factors of the application will not be studied in depth, nor will the participation and training of the educational personnel of INEA. Although these aspects were analyzed, due to space limitations, they will not be included here.

Description of the TEJA Model
Foundation
The TEJA model is based on a constructivist sociocultural posture, particularly the idea that learning is meaningful when linked to experience in individual and collective life; specifically, the model utilizes the idea that knowledge is built in processes of negotiating meanings as a group (Hansman, 2001; Brown, Collins and Duguid, 1989).

The model also recognizes that cognitive processes are mediated by the emotions—a fact that takes on great relevance in the case of individuals whose previous contact with technology has been practically null. In this manner, emphasis is placed on aspects such as the sensation of attainment, intrinsic motivation, and self-sufficiency in using technology (Bandura, 1991). According to the positions that sustain that learning is lifelong, the model insists on recognizing the knowledge that people have acquired outside of school.

Regarding the incorporation of ICT in education, the basis is that such technology should be considered a "cognitive partner" rather than a static provider of information. From this conception, ICTs are assumed to be collaborators in students' cognitive processes and in problem-solving. The process of learning "with" computers is centered on the individual and not on the technological device (Salinas, *et al.*, 2004; Jonassen, 1996).

In its community dimension, the conception of the model is permeated by some principles of the Latin American current of low-class education; in particular, the dialectic perspective of the production of knowledge that proposes starting from practice, reflecting on practice and returning to reality to transform it, as well as the horizontal relation between students and teachers (ICI, 1997; Zarco, 2001).
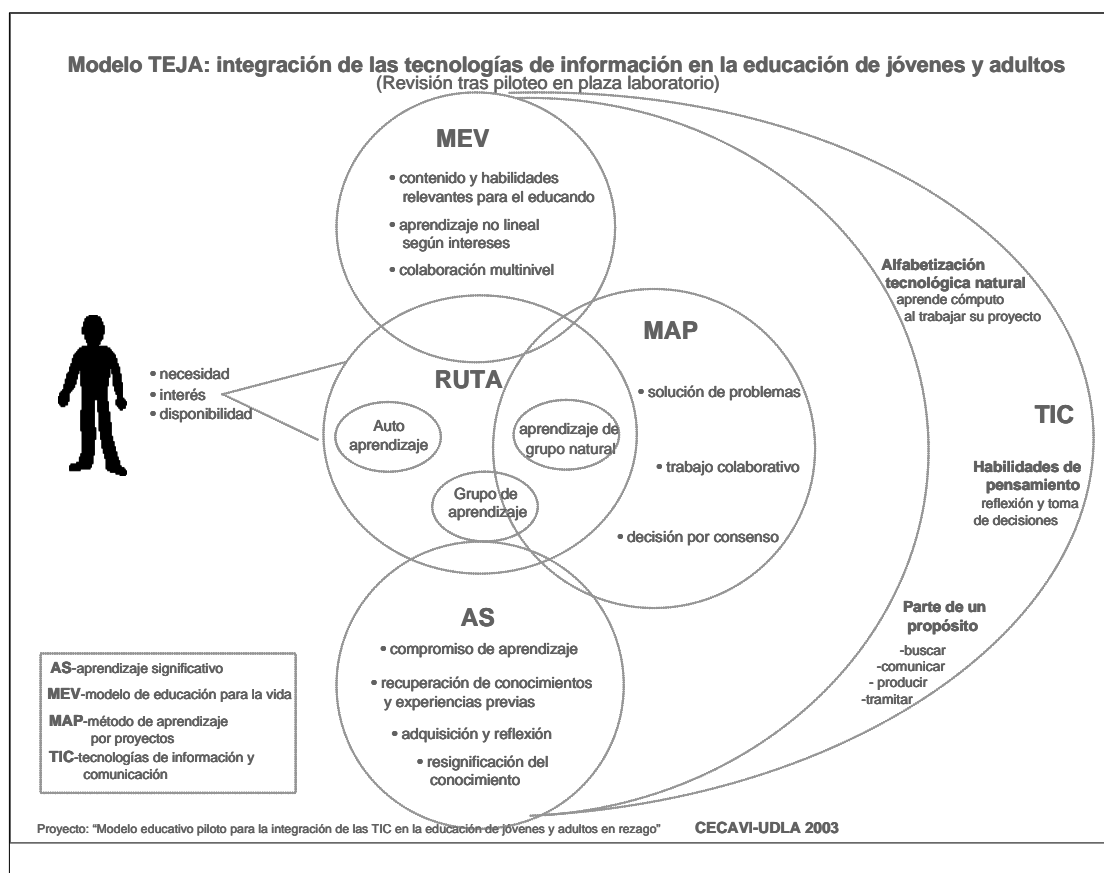
The aims of the TEJA model are:

- To integrate ICTs into the educational process of MEVyT and eradicate the separations among training in computer skills, learning the curriculum, and needs

- To respond with differentiated strategies to three population groups who attended or could attend the plaza: *a)* students enrolled in INEA who receive individual counseling; *b)* students from INEA with the same counseling schedules, who form a circumstantial group; *c)* natural community groups, not enrolled in INEA, in a poverty-stricken situation and generally without a complete basic education
- To promote the development of thinking skills (problem solving, teamwork, oral expression, and decision-making by consensus) by using technology linked to the user's sociocultural context
- To encourage intrinsic motivation to use technology, and strengthen self-sufficiency based on the feeling of achievement upon reaching concrete goals
- To promote equal access to technology through guided strategies directed to less favored groups
- To facilitate the process of discovering significant applications of ICT for daily life and community development

Methodological Strategy

As Graph 1 illustrates, the starting point is the individual, his interests and needs, and his available time for studying. This starting point is the basis for selecting the route of learning. The three routes are options that adapt to adult reality, yet they have the same conceptual and methodological focus. The route is the basic unit that allows the model to operate. It integrates four components: MEVYT, ICT, methodology by project and meaningful learning.

Modelo TEJA: integración de las tecnologías de información en la educación de jóvenes y adultos
(Revisión tras piloteo en plaza laboratorio)

MEV
- contenido y habilidades relevantes para el educando
- aprendizaje no lineal según intereses
- colaboración multinivel

Alfabetización tecnológica natural
aprende cómputo al trabajar su proyecto

MAP
- solución de problemas
- trabajo colaborativo
- decisión por consenso

RUTA
- Auto aprendizaje
- aprendizaje de grupo natural
- Grupo de aprendizaje

- necesidad
- interés
- disponibilidad

TIC
Habilidades de pensamiento
reflexión y toma de decisiones

Parte de un propósito
-buscar
-comunicar
- producir
-tramitar

AS
- compromiso de aprendizaje
- recuperación de conocimientos y experiencias previas
- adquisición y reflexión
- resignificación del conocimiento

AS-aprendizaje significativo
MEV-modelo de educación para la vida
MAP-método de aprendizaje por proyectos
TIC-tecnologías de información y comunicación

Proyecto: "Modelo educativo piloto para la integración de las TIC en la educación de jóvenes y adultos en rezago"   **CECAVI-UDLA 2003**

Route 1 (R1) or the *Individual Learning* mode is for adults who cannot attend class with a group. They receive individual advising, either because of a lack of available time or because they do not like to learn along with others.

Route 2 (R2) or the *Group Learning* mode is when two or more adults in different modules have the same schedule and advisor.

Route 3 (R3) or the *Natural Group Learning* mode, is for people who already are in a group with shared interests and activities. They are not enrolled in INEA. They are invited to use ICT for a group project; access is open to the community and enrollment in basic education is promoted.

The focus of MEVyT is respected. In other words, the selection of content, activities and skills takes adult interests into consideration, and does not encourage the linear learning of modules. Cooperation is encouraged among students enrolled in different modules and levels.

Meaningful learning (ML) is attained by applying the methodological moments of MEVyT: *a)* the recuperation of student knowledge and experiences, *b)* acquisition and reflection through pedagogical components, MEVyT, ICT and the individual or group project, and *c)* the meaningfulness of knowledge throughout the entire process, and not simply at the end. In addition, an initial stage is incorporated, consisting of the adult's "commitment to learning".

The method of project-based learning is the articulating element among student needs, MEVyT and ICT. The change lies in that students aim not to pass an examination, but to develop their own project. The stages of the overall process are illustrated below.

ICT are an ever present resource, and serve as tools for carrying out MEVyT activities and the project tasks defined by the participants. In this manner, computers and videos are used immediately. Students do not take previous computer courses, and they lose their fear of technology. In other words, technological literacy is developed in a natural and meaningful manner.

Context of Application: Four Rural Communities
Presented below is a brief profile of the communities selected for carrying out the pilot application of the TEJA model. The selection criteria are explained in the section on methodology.

Álamos, Sonora. Municipal (county) seat; tourism is its main source of income; the cost of living is high, with high rates of unemployment and migration; it is catalogued as having a low level of well-being, and more than fifty percent of its population has not completed basic education. It has deficient means of communication and contains a large number of small, distant communities. There is strong attachment to religious tradition and traditional gender roles. The plaza functions as a teacher training center.

Cócorit, Sonora. A Yaqui Indian community with a large mestizo population. Drought has affected agricultural production; most employment is in industrial transformation, services, small businesses, and trades. Public services are deficient in spite of good means of communication. The community practices traditional gender roles, and there is a high rate of teenage pregnancy. The plaza functions as the community center for PROVAY, a nonprofit association.

Yecapixtla, Morelos. A semi-rural population, its main economic activities are agriculture (corn, beans and tomatoes), cattle, and business; butchering is the predominant trade. Services and tourism are undergoing urbanization. The average level of the population is medium poverty (lower middle and lower socioeconomic level) with a high

index of educational backwardness. The general culture is conservative and women's participation in formal organizations is low (except for some government organizations). The community plaza is in an elementary school and opens only in the afternoon.

Yautepec, Morelos. Producer of rice, sugar cane and tomatoes; sugar mills and nurseries are an important source of employment. It is a marginal urban community with social problems like gangs, drug addiction and broken families, with influence from the two nearby cities: Mexico City and Cuernavaca, the state capital. Most of the town's services are urbanized. Almost one-half of the population has not completed basic education; religious tradition is strong. The plaza functions as a center of Instituto Mexicano del Seguro Social.

Methodology

This research was preceded by a diagnosis (not the subject of this article) and the design of a model. The methodology used had two components: the first was its application in the field, directed by the research team, inspired by the perspective of research/action in order to prove the TEJA model and train educational agents by modeling in practice; the second component was the qualitative methodology used for the recording and analysis of results during and at the end of the process. Elements to systematize educational action were used to reconstruct the model's operating strategy, oriented to verify the hypotheses of action.

The application was carried out in cooperation with state and municipal authorities, as well as with the local personnel of each participating community plaza where joint learning occurred. The data collected on the adults' and young people's uses of technology and their perceptions of the project learning method, were addressed from an emerging interpretative posture, since previous hypotheses or theories about this phenomenon were not used as a starting point. This vision permitted identifying unforeseen processes and effects, which we consider important to share in this article. They are presented at an initial level of analysis.

Participants and Communities

The selection of the plazas for applying the model was based on the following criteria: location in a rural context of poverty, with high levels of educational backwardness (incomplete basic education); application of MEVyT; installed Internet; geographical location (two community plazas in northern Mexico and two in southern Mexico); high social cohesion in two plazas and low social cohesion in two; presence of active local groups in two plazas and an absence of such groups in two.

Thus in agreement with the Academic Director of INEA, two plazas were selected in northern Mexico—the state of Sonora (Cócorit and Álamos)—and two plazas in south central Mexico—the state of Morelos (Yecapixtla and Yautepec). The participants in the application process were four plaza promoters, four technicians, ten adult advisors and 103 young people and adults.

Two teams of researchers were in charge of the fieldwork in two communities per state, and moved to the area to live. Each team had two members: a university research assistant and another with experience as an INEA advisor, yet previously trained in applying the model. The rest of the central team, consisting of four full-time researchers, made three visits to each state during the three-month duration of the application, between February and April, 2004.[5]

Instruments

Logs were used for each stage of the methodological strategy, and field diaries to record the participants' progress on each route, as well as events in the context of the application. The researchers who lived in the communities reported on their notes during the intermediate meetings, in order to discuss them with the central team. The participants' presentations of results to the community were another valuable instrument for discovering the reality and documenting the cases in further depth. The participants' perceptions of their learning, texts and products were another valuable source of information. Photographic records were made, as well as videotapes of some of the meetings with the research team and young people and adults.

Analysis
The analysis was completed in two stages. The first stage considered the model's aims in order to observe compliance and the application of the phases of the educational strategy in the four contexts; this stage was carried out during and at the end of the process. The second stage occurred after the application to discover recurring usage patterns of technology, to systematize the experience of using the methodology in the four communities, and to detect unforeseen results. The unit of analysis was the routes of learning, which were used to group the cases from the four plazas and communities.

Results
Description of Cases by Project and Meaningful Use of Technology
Described below are the cases that illustrate the variety of individuals, use of ICT, type of projects and results obtained.

Individual Learning: Young People and Adults who Study Alone (R1)
Approximately 29 young people and adults participated in the individual mode of learning.

From illiterate to writing on the computer: double literacy.
Jorge, an illiterate young man, aged sixteen and a tour guide in his community, decided "to write a little book about the legends of Álamos" to offer information to visitors in his town. He inputted[6] the information and presented it publicly; in addition, he received credit for the initial module of basic education, with outstanding grades. This case showed the double task of literacy: computer literacy and reading/writing. Both processes occurred in a natural form for Jorge, in relation to his personal interest and in agreement with his daily life.

Access to Information and the Defense of Human Rights
Francisca, age 38, was working in an in-bond plant and attending secondary school. On reading about human rights in her textbook, she began to wonder if the imprisonment of her father was fair. She researched the Internet for more information on human rights to serve for his defense. With the support of the nonprofit organization that operated in the community plaza, she obtained her father's release.

A Voice for the Voiceless
Brígida, age 35 and a housewife, was attending secondary school. After reading the module on "Family Violence", she realized that her rights had been violated as a child. She decided to design and input a triptych to explain children's rights. She used the Internet to search for more information on the topic and obtain images for the triptych.

Women to the Rescue of Local Traditions

Meche, age 19, single, unemployed and enrolled in secondary school, decided to research local traditions. She used the Internet to look for information about her community, regional dishes, history, and customs. She used word processing software to describe the custom of asking for a girl's hand in marriage; at the end, she added her personal reflections. The topic interested one of her classmates, who joined in Meche's efforts to rescue their traditions.

Need and Persistence regarding the Challenge of Using the Computer

María, a housewife about 40 years old, who worked in informal sales and was enrolled in secondary school, inputted a request for an electrical connection. Although she was the most challenged in using the computer, she never gave up. She realized that the products of her labor were received with pleasure, and that the possibility of an almost immediate tangible result of her new knowledge was very satisfactory.

Group Learning: Young People and Adults who Study Together (R2)

This mode applied to 28 young people and adults.

Housewives against Videogames

This group was formed by four women, ages 20 to 28; all were enrolled in secondary school and were housewives, except for one single woman. The concerns of the majority were centered on raising their children. During the process, they identified the problem of their children's spending too much time watching television or playing videogames outside of the home. They used the Internet to look for additional information, and watched videos about the advantages and disadvantages of videogames. Subsequently, based on the module of "Fractions and Percentages", they designed and applied a survey to discover the frequency of this problem in their community. At the beginning, they were nervous about using a computer, and one of the women even refused to touch it. However, they soon designed and inputted a brochure that explained the problem and proposed certain solutions; the brochure included a graph they had prepared on a spread sheet to summarize the results of their survey.

Rejected Adolescents

This group consists of fifteen adolescents, ages 13 to 17, mostly girls, expelled from regular schools and sent by their parents to INEA to finish their basic education. Almost all of the group's members were from broken homes. Most were enrolled in secondary school, some were enrolled in elementary schools, and one of the girls, age 14, was in literacy classes. All the group members expressed the problem of a lack of communication with their parents, and decided to make a poster to present at a meeting to be attended by their parents. They used the Internet to search for information on how to make a poster, as well as for images to support their ideas. They analyzed videos on communication and inputted their messages, with the addition of images. On the poster, the youngest group member showed an image of a dog that was saying, "Don't treat me like it..." followed by another image of a boy with the phrase "but like what I am".

Teenaged Girls and Self-esteem

This group consists of seven girls, ages 14 to 17, who are enrolled in secondary school; because of their personal and family problems, they needed to learn what it means to "love yourself". The knowledge gained and discussed during the project encouraged some to make life decisions, as they came to realize they were being utilized. The girls looked for

information on the topic (on the Internet, in videos and in the modules, such as "Being Young"), summarized the information and used it to present a play for "other girls like us". They inputted topic summaries, the script and character descriptions. They also obtained E-mail accounts and instant messaging.

Improving the Business: Previous Knowledge and New Learning
This group was formed by two entrepreneurial sisters-in-law, approximately 35 years old. One of them was in secondary school, while the other completed secondary school in the regular school system. At the time, they were selling flour tortillas. The incentive was the module "My Business", and their project consisted of creating a plan for their small business. After reviewing the module and discussing it at meetings, they inputted their plan and designed a sheet for advertising. They included their estimates and inventory on the spread sheet.

Natural Group: Shares Interests and Activities (R3)
Presented below are the projects carried out by groups that already existed in the communities. The participants were 46 adults, mostly women.

Women Who Make Dairy Products
This group of ten women, housewives between ages 20 and 45, graduates of elementary school, had taken workshops on making dairy products. The women were enthusiastic and entrepreneurial, interested in creating a business to produce and sell products. They researched the Internet about requirements and steps for opening a business and obtaining credit. Some of them opened E-mail accounts to receive information. Watching a video on women's organizations motivated them to continue with the project. Based on the information they compiled, they planned their activities, but the remaining time was insufficient for us to follow up on the group and learn if the business had been opened.

Indian Women: Traditional Embroidery and Use of ICT
In this case, we have seven Yaqui embroiderers. Two were over age 60, and the others averaged about 35 years old. They combined their functions as housewives with the work of laborers and sellers. One of the two oldest women was illiterate and the other had finished third grade. The other women had some secondary school. They agreed on their common interest and project of producing traditional embroidery to preserve their indigenous tradition, and named their group "Magic Hands". They consulted the Internet about the embroidery of Yaquis and other ethnic groups. Each women inputted her justification for carrying out the project. As a group, they established and inputted their rules, and wrote a letter to request shop space for selling their embroidered work. On a spread sheet, they prepared a budget and materials inventory. They resented that the planning process took away time from their embroidery. Afterwards, however, they realized that the plan had helped them to know what, who, and how each product would be made. What this group enjoyed most was their own space to carry out the project.

"The Queens of Embroidery": Leaders in Problem Solving
These three group leaders are women over age 45. Two had finished secondary school and the third had not. They combined their work as housewives with the sale of various products. Their group, which they named "The Queens of Embroidery" consisted of 21 women, most with incomplete basic education, and heavily indebted to the State Institute of Women, which had financed their project to produce traditional embroidery. Participation from the entire group was encouraged, yet only the leaders attended. They

proposed organizing the group's files to enable them to request an extension of payment on their debt. They analyzed a video called *Women who Organize*, and inputted the minutes of their meetings as well as the receipts of group contributions. By using a spread sheet, they prepared a materials inventory and a budget. The need to solve the problem of the debt facilitated the process, yet the remaining group members did not join in their efforts.

Women Using ICT for the Collective Good
A group formed by four women with an average age of 35, consisted of housewives, sellers, and neighbors who had a trajectory of leadership and organization in other projects. One had finished basic education, two were in elementary school and the other was in secondary school. Their shared problem was the lack of basic products, due to distant supply centers and the community's situation as a center for tourism. The women agreed to request support from the International Food Bank program, in order to obtain supplies at a low cost. They reviewed modules of MEVyT, such as "The Education of Our Sons and Daughters", along with videos and the Internet to find information that would allow them to justify the project. They wrote and inputted their request for support. On a spread sheet they prepared the list of those benefited and the cost of products in their neighborhood, in comparison with larger stores. Using a drawing package, they produced a map that showed the distance of more economical stores from their neighborhood. The benefit was granted, first for 100 families and then for 140.

"The Fans": Biographies and Community History
A group of more than fifteen retired men named their collective "The Fans". Most of them had not completed elementary school, and only one was employed, as a watchman. The men usually met in the town's main park, in front of the community plaza. They started going to the plaza to carry out a project of common interest, consisting of making a compendium of the group member's autobiographies and some community history. According to their physical abilities and perseverance in using the computer, they inputted their stores. Some obtained E-mail addresses. The group members greatly enjoyed spending time together, as they had in the park.

"The Cholos": An Enjoyment of Dancing and Access to ICT
This group of seven girls and boys from 14 to 17 named itself "Big Boys". The group members recognized themselves as "cholos". They liked to break dance and decided to organize a public exhibition. They inputted a justification of their dancing and prepared a triptych to advertise their presentation. On the Internet they obtained music, images and texts for the triptych. They also learned to chat on line with other "cholos". They analyzed a video to study the dance moves of other groups. Their enjoyment of the project motivated the group members' regular attendance at the community plaza; they declared they liked "doing what they like to do". On occasions, however, their rebelliousness delayed the project activities.

Application of the Model's Methodological Strategy in the Field
Described below is the application of the model's methodological strategy and some of the difficulties from the perspective of the facilitating research team. This section was organized according to the stages of the overall process.

Selection of the Personal or Group Problem/Need

Using the popcorn method, the participants expressed their needs and problems in accordance with their individual circumstances, in ordere to reach a consensus of group priorities, based on two criteria: pertinence (having a relation with community values, customs and practices) and knowledge (what the group knows most or would like to learn). For example, for the Yaquis, the most important criterion was preserving their traditions (pertinence). In most cases, group discussion and reflection on needs required several sessions. In the natural groups with a previous organization (women from the food bank, "The Fans", women who made dairy products), the detection of needs was easier since some needs had already been identified. In contrast, the newly formed groups (adolescents interested in self-esteem) or loosely integrated groups (housewives against videogames, rejected adolescents) encountered greater difficulties in analyzing and reaching an agreement. Other elements that intervened in this stage were the capacity of analysis, the educational level, and the habit of expressing ideas as a team. The researchers' integration into the group was a slow, gradual process; outstanding was the case of the Yaqui women, in which the first sessions were held in their native language. A case in Cócorit that hoped to begin a group project (R2) was unfruitful because attendance was irregular for four consecutive sessions, and no consensus of a shared need was reached.

Identification of a Solution and Project Definition
In the case of collective projects (R2 and R3), once the need was defined, the group was requested to visualize and propose various options for a solution. "The Queens of Embroidery", for example, proposed modifying their organization or arranging group information to solve the debt problem. By consensus, a solution was selected in accordance with the following criteria: pertinence, knowledge, available resources, cost and time. The women decided that organizing their information was urgent. The selected option was rewritten in the form of a project proposal to achieve a viable, "tangible project"; thus, they prepared a file with the use of Word software and a spread sheet with Excel, to document their minutes, attendance lists, inventories, quotes, and expenses. The clearness of the project's objective increased the members' visualization of success. In all cases, members were found to be motivated to learn what was necessary to reach their goal, since the goal was directly related to real need. The definition of a tangible product was more difficult for the women in the food bank, due to their visualization of long-term solutions beyond the period of research.

Preparation of a Commitment and Work Plan
In the case of individual projects (R1), student made a written commitment to learn, in which they specifed the objective or product in relation to the module(s) being covered. While planning her triptych on children's rights, Brígida was studying the module of "Family Violence"; her objective was to publish those rights and contribute to preventing the violence of which she had been a victim. Commitment in independent learning brought about the expected motivation in most cases. Azucena, for example, committed to finishing a recipe book within a certain time period, to use the portions learned in her module. The same effect was not seen, however, in four adolescents who were obligated to combine school with work.

   In the collective projects, a work plan was prepared to list the agreed upon tasks, responsibilities and time frames. The women in the food bank accepted tasks with great responsibility. One woman invested more time than planned in researching the cost of basic products in various stores; her motivation was the group commitment to deliver an application on time to the donating institution, in order to obtain the benefit. A frequent

observation was group difficulty in anticipating and detailing the activities and tasks required by projects.

Analysis of Activities or Tasks to Carry Out

To carry out each task, a "poster" was followed. Designed as an algorithm, it helped students decide on the resources to use, whether digital, printed, audiovisual or community-based. The posters also encouraged reflection on the use of ICT (method of usage). On analyzing available resources, some women identified the importance of knowing about the experiences of others, and opted to interview other groups or consult a video on the process of organizing poverty-stricken women. The poster induces reflection and decision-making by means of four activities: looking for information, producing or creating something, communicating, and arranging a service. For example, the girls on the self-esteem project *looked for* information by using various ICT and *produced* a play to *explain* to other adolescents the importance of self-esteem; they *arranged* the application with the municipality to present their play in a nearby community.

The Product is Shared with the Community

In an attempt to gain acceptance for the project, the product obtained is presented to other people. The various reasons for doing so include: a possible reply, motivation to cooperate, awareness, convincement or communication. On various occasions, public presentations were prepared for the group's peers, members of the community, and INEA and municipal authorities, as in the case of "Los cholos", "The Queens of Embroidery" and Jorge. In other cases, presentations were made only for family members and the personnel of the community plaza, such as the group of women against videogames, the rejected adolescents and the producers of dairy products. The achieved impact was of a different level in the cases covered by this research, ranging from modifications in the perception of Others (vindication of "Los cholos" through their dancing), prevention of violence in a small group, modifications in self-concept and family appreciation, up to important decisions in international financing for long-term adult education.

A New Cycle Begins with Another Need

In spite of the short period of fieldwork in this research project, some indications of other possible projects were perceived. The girls involved in self-esteem expressed their interest in drug addition and the prostitution of minors, topics that one of them is familiar with in daily life. In Cócorit, a group of seven individuals of both sexes and varying ages, socioeconomic levels and occupations (who initially participated in independent learning), decided to form a group to organize a conference on family communication problems (a topic addressed by various modules). The idea motivated them to attend the community plaza on a daily basis in search of meeting space, due to restricted time.

Analysis of Results

The cases presented are analyzed in relation to the ends of the model, as indications of success in applying the model in real contexts. Attention is centered on the meaningful uses of technology, the principal focus of this article. In terms of the application of the methodology, an analysis is made of the difficulties of some stages, certain important factors for the success of each route, and the social/emotional implications for the facilitators.

The participants used ICT to carry out concrete project tasks. Their started in the computer room on their first day, without receiving prior orientation on computers. Young people, adults and retirees experienced the applications of ICT in their daily lives, by doing

the accounting for small businesses, making invitations for a family or community celebration, preparing ads, or looking for information on a topic of interest. In becoming better organized, "The Queens of Embroidery" stated that "now we can keep minutes, receipts or inventories".

The immediate use of technology with a purpose occurred on the three routes, and various strategies facilitated the inclusion of groups and individuals, taking into consideration their circumstances and interests. Some differences were observed, however, in the process and in perceived learning. For example, upon the conclusion of the group projects (R2 and R3), the majority affirmed that their greatest learning had been in "how to organize as a group and function as a group". In independent learning (R1), private experiences and feelings abounded, as well as very personal needs, which the participants attempted to meet by linking a MEVyT module with ICT, as explained in the cases of Francisca, Brígida and Jorge. In mode R1, the sense of achievement is very immediate, since small-scale results are attained over the short term.

In contrast, in the group projects of R2 and R3, the participants required more time to obtain the final result. The group's rate of progress and time constraints sometimes caused desynchronization with each student's MEVyT modules and the exam dates. The relation between the R2 project and the modules was established, but only in specific sections and in some cases. Desynchronization between the project and curriculum is a frequent phenomenon in project learning.

Increases in oral participation and academic achievement in critical cases of individuals with learning or psychological problems (depression or a lack of concentration), became evident in their shyness and isolation. A field log documents the following:

> Juan, age 38, was in R1 and decided to join with other students to form an R2 group. As a project, they organized a conference with a psychologist on family communication. Young people who had previously experienced failure, like Librada, who failed the module on "People Understand Each Other by Talking" on three different occasions, joined the Self-esteem group. In this group, she was an active participant and spoke often; she was finally able to pass the module.

The process of group discussion and reflection demanded the use of skills in oral expression, decision-making by consensus, and the analysis of alternatives. The stage of defining tasks and selecting the adequate means for completing them, was difficult and time-consuming for the group; some expressed, "we get a headache because they make us think a lot". The expression of ideas in the group increased when agreements were negotiated, and the "quiet ones" often became active participants.

Teamwork and cooperative learning materialized when the group prepared the work plan for achieving results. The tasks and responsibilities agreed upon by the group were generally fulfilled in a timely manner. "The group of Yaqui women, known as 'Magic Hands', distributed the tasks: one woman brought designs, another the quotation for materials, and another wrote the project justification. Everyone did her job." The members' response meant that the plan was meaningful for their lives. "In the group of 'Housewives against Videogames', one woman hurt her foot and her daughter got sick, but she sent what she was responsible for to the plaza."

The adults' intrinsic motivation to use technology was strengthened by their feelings of success on seeing the tangible results of their ability to carry out a small task, in contributing to the development of their collective project. A frequently observed situation was individuals' increased sense of self-efficiency after conquering the fear of using the computer. "Conchita said she wasn't going to be able to do it, that she was very slow, that

she was afraid. When she found the information she was looking for and realized that it was easy, she would take on the jobs that required using the computer; she went beyond the scheduled advising time, even when she had problems with her husband." A surprising effect was the physical discomfort suffered by two adult advisors and the adolescents in the self-esteem group on using the computer for the first time. They reported dizziness, headache and stomachache, possibly attributable to their perception of low initial self-effectiveness with the technology, resulting in disqualification and escape from the task in advance (Covington, 2000). This phenomenon will need to be researched in the future.

Equal access to technology, even by adults and groups who had not used technology previously in spite of its free availability in the community plaza, was promoted intentionally through the methodological strategy. No announcement was made that programs of technological access were involved. In this sense, an unexpected result was the "snowball effect" of the projects (R2 and R3) in the community: the participants commented on their computer activities and promoted the plaza. Other people came to join the groups, such as the women from the food bank, "Los cholos", "The Fans" and "Magic Hands". This effect also occurred among the adults already enrolled in the plaza, since in some cases R1 became group projects (R2) on their own initiative. "Four women decided to work in a group to do a small project, with the purpose of organizing a workshop about venereal diseases"; in two cases, learning was transferred from project methodology to other activities in which the women had previously participated. "Tulita, from the group of 'Queens of Embroidery', used it to solve the problem of the firemen who had been terminated in her neighborhood."

Tendencies were found in the meaningful applications of ICT, which were used as follows:

- To support the internal organization and management of projects involving handmade crafts or production. In the case of the entrepreneurial women, the model's methodology served to catalyze existing natural leadership, which is exercised in another way through the project; i.e., in a more efficient, cooperative and flexible manner.
- To document community legends or traditions, an interest evident in young people and retirees. They used their project to produce a text of stories or living customs, and possibly explain a tacit sense of their social identity. According to the socio-constructivist focus of identity of Wittgenstein, the symbolic nature of social reality is built through inter-subjective meanings depicted in objects arising from communication (Ibáñez, 1994).
- To express feelings, opinions, interests and values clearly linked to their experiences or suffering, as occurred in various groups of young people, women and retirees. The following excerpts from their texts are illustrative:

  We embroider because we want to, because we like it, and so that the tradition of Yaqui embroidery is not lost, and the younger generations can continue with our uses and customs […]

  I would like to reach the bottom of the topic [self-esteem] and help people. I have a cousin who is a prostitute and what hurts me most in life is having lost my brother because of drugs.

Many people look down on us as bums, cholos, drug addicts, but they don't know that we dance to distract ourselves from drugs. We are asking them a favor: "If you see us dance, don't say 'Bums!' because that's hostile."

I want to tell you a personal story. I finished the Family Violence module and it produced a series of feelings in me, since it is similar to what I experienced as a little girl […] Using the poster, we took the route of "communicating" because we wanted to create a document that [would contain] information to prevent violence toward boys and girls.

Because of the short time of the pilot study, the use of the computer and the Internet was very basic—only the fundamentals for carrying out a concrete task were learned.

The application of the methodological strategy encountered difficulties: relating the contents of modules, individual dates of evaluation, and the pace of the group project. The use of the algorithm for the poster to support the project, was attractive for the participants and obligated them to reflect; however, the process had a high degree of difficulty. As a result, it should be revised and adapted to mental representations more in agreement with the popular practices of alternative analysis.

Contact with the natural groups, especially in the Yaqui community, was easier when initiated by a recognized leader, who would then introduce the facilitators. Another key factor was going to the group meeting places before taking the group to the institutional space of the community plaza. This process required an investment of time at the beginning, but ensured more lasting results of motivation and continuity. The process with the natural groups revealed that groups with a certain organizational trajectory and style of carrying out projects were more reluctant to participate. In contrast, more informal groups were motivated faster, due to their requirement for support in defining a shared need to detonate their project.

In group learning (R2), the initial process of identifying a common need to initiate the project was long and difficult, because of the groups' heterogeneity. Constructing a space where young people and adults could express their problems—and feel a part of the group—ensured their attendance and commitment.

A key factor for participation in independent learning (R1) was providing individuals with trust and permanent emotional support. The symbol of signing their commitment to learning motivated the attainment of small goals within time frames established by the participants themselves. On various projects, the participants expressed genuine interest in learning about the experiences of other groups. This aspect could be emphasized to establish contact and networks for peers, with the use of ICT.

The emotional component was also important during the application. Human company for excluded young people and adults, interaction and participation in success, fear and celebrations, motivated their attendance and persistence. Their closeness to daily life explains the facilitators' difficulties in establishing limits between education and the crude realities of the violation of human rights, poverty and injustice. Detachment from individuals and communities must be part of the researcher's training.

Conclusions and Discussion
On the Meaningful Uses of Technology
A finding that emerged as a generalized tendency was the preponderant use that the participants assigned to technology for communication and expression. This finding differs from the expectations and functions often attributed to ICT, as a means to improve an economic situation, employment, or production projects (Day and Grewan, 2003; Berger,

2001). Technology was used to expand the individual's own voice, by expressing a message to be shared with his peers. This activity required thinking skills, as the participants wrote about their values and experiences or summarized meaningful topics to be shared. Subjectivity as a category of identity permits expressing an individual or group activity to others. In the case of the students and adult educators, subjectivities emerge in practice when the contextual nature of the construction of knowledge is assumed (Tisdell, 2000, quoted in Chapman, 2003). If we consider the texts that the participants prepared with the help of the computer as a form of "self-writing" (due to their autobiographic content), according to Chapman (2003), they can represent a form of knowing one's self, and an ethic of practice that emerges from what we are in daily life. This way of writing about and for one's self develops an active experience.

The interest of young people and adults is centered on local communication: they directed their messages to their family, neighbors, peers or local authorities; they used ICT to improve the presentation of media they were already familiar with (posters, brochures, fliers, notebooks, plays) by making them more attractive, organized and serious. Technology seems to have provided their productions with formality, dignity, and consequently, credibility. New technology was incorporated into habitual media and channels—a result in agreement with other research, which shows that even teachers use ICT as an additional element of their pedagogical arsenal, in order to make their previously used media more functional (Sasseville, 2004).

The participants' focus, during their initial contact with the computer, on local communication, project administration, or the writing of community traditions can be explained on different levels. On one hand, the methodology of project learning oriented the products and computer tasks to personal and local problems. The deficient functioning of the Internet in these locations reduced the possibilities of using it for remote communication. On the other hand, adults have a need for a group space to share and talk about their activities and world (Solar, 2001; Pieck, 1996). The need to express and communicate something to others can be understood as the use of technology of representation and self-representation to mirror the group and project its values to other (Ramos, 2005). This interpretation has been proven by analyses of the cultural function of other technologies—visual technology or radio—in studies on ethnic means (Turner, 1991, cit. en Ramos, 2005).

On the Acceptance of the Methodological Strategy
A factor of acceptance was that the participants felt they were treated as adults, young people, or individuals, more than as "students". The groups of women showed a catalyzing effect of leadership and previous organizational experiences. The integration of ICT, based on interests, involved women, young people, older adults, and those who had been rejected. The "snowball effect" of more individuals' joining the groups could have been due to factors such has having a formal meeting place in the plaza and constant educational accompaniment—which gave the groups "formality" and recognition. Other factors may have been the importance of acquiring visibility and legitimacy in the community, the need to belong to a group and be heard, and feeling "at home".

Attracting excluded groups was shown to require time and experience in community promotion, in order to identify the groups, motivate them and gain their trust. In addition, initial contact with the groups' natural leaders was a determining factor in encouraging participation and providing the facilitators with legitimacy.

The model did not work in a case of rebellious girls (ages 14 to 18) who had recently dropped out of school. They viewed the plaza as "another school" where they were

enrolled against their will and under their parents' supervision. At the plaza, they reproduced the practices of disinterest and absenteeism they had shown in regular school.

On Using Technology in Rural Contexts
Undoubtedly, in the context of this pilot study, computer technology was accepted by the participants and their families or neighbors. This phenomenon can be explained because the invitation and the starting point of the activities were not represented as using ICT. When the initial contact occurred, it was within the dynamic of the project. In addition, acceptance may be a result of the value and security provided by using the computer: the participants were able to show their ability proudly to families and neighbors.

An implication of this project for rural education in general is that the generation of educational processes from the inside, with participant involvement in making decisions on their learning, facilitated participation and continuity. This pilot experience strengthens the historical criticism of the compensatory focus, in the sense that "in Mexico there is education in the rural areas, but not an education for the rural population—education created for and with the peasant and indigenous communities" (Tovar, 2004:322).

On the Eventual Adoption of the Model in Adult Education
Although the INEA authorities expected a proposal for integrating ICT, in practice, their greatest concern was timely certification: compliance with quantitative goals in the dynamics that orient the activity of all personnel. In terms of the model's contribution to increased schooling, two phenomena were observed. In some cases, higher motivation led to enrollment and the passing of examinations, while in other cases, enthusiasm about doing a group project slowed individual progress in MEVyT modules. The short time of this pilot study was an obstacle to a categorical conclusion, but the affirmation can be made that when education is anchored in problems and topics of interest for students, a more lasting sense of learning is constructed (Hansman, 2001).

One question remains with regard to the perspectives of the future adoption and generalization of the model. Although it was accepted by the central academic authorities, its execution seems to have political, bureaucratic and administrative implications that surpass the academic criteria. INEA is confronting once more the historical dilemma of investing in processes of meaningful learning and promotion or limiting itself to raising enrollment rates from a compensatory focus. With the installation of community plazas in its structure, the institution has unresolved tension between its original mandate of education, and the new challenge of digital equality linked to the pedagogical innovation represented by MEVyT.

In summary, the conclusion is that the pilot application of the TEJA model in four community plazas of the INEA, for three months, showed that ICT can be integrated into learning processes and community organizations without requiring previous computer courses. Retirees, adults and young people from rural areas used the technology immediately and discovered meaningful uses when it was linked to the development of small projects in agreement with their interests. Three tendencies were identified in these uses: the support of internal organization, the recovery of community traditions, and especially, the "communication" of feelings, values and ideas in the local setting. The use of ICT was only at an introductory level since the pilot period did not permit attaining the technical mastery of programs or Internet navigation.

An emerging finding was the communicative function the participants assigned to technology as a need to broaden their own voice; some lines of interpretation presented were the need for expression, self-representation and group identity.

The careful recording of the application process, of the participants' products and their own evaluations are indications of the model's success in the exercise of thinking skills, teamwork, increased self-effectiveness, and the intrinsic motivation to use technology, as well as the strengthening of community groups. The application of the model explores a very concrete strategy for closing the digital divide and providing access to technology to excluded or self-excluded groups.

In perspective, the viability of generalization of this model in governmental institutions is determined by bureaucratic processes, the design of social policies—especially the conditioned financing of quantitative coverage—and by the vision of education, communities, and digital equality.

Notes

[1] In early 2004, the existence of 2,500 community plazas was reported. By the time this article was written, the number had increased (http://inafed.gob.mx).

[2] This innovation, which proposes articulating educational action with individuals' life experience and demands, on both an individual and collective plane, is an important change in the above educational conception. It sets aside the rigidity of fixed, obligatory levels and emphasizes the development of skills for improving the conditions of personal, family, employment and community life.

[3] "Seguimiento and retroalimentación para la construcción de la Propuesta educativa de las plazas comunitarias del INEA-CONEVyT" ("Follow-up and Feedback for the Construction of the Educational Proposal for the Community Plazas of INEA-CONEVyT")

[4] The extensive results are found in the report delivered to INEA: "Socio-educational Characterization of the Community Plazas of INEA-CONEVyT. Qualitative Exploratory Study after One Year of Operations".

[5] The authors acknowledge Dr. Antonio Santos Moreno, the head researcher of the Group, for his contribution in designing the TEJA model, as well as the commitment and rigor of our co-workers, who were advisors for INEA: Margarita Cortés Cuamayt, a young woman nineteen years of age and a native of Villa Alta, Tlaxcala; and Alma Juárez, a young linguist from Tepetitla, Tlaxcala.

[6] Inputting as used in this article refers to writing with a word processor.

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