

The Pool Effect: More Access, Sharing, & Resources

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ABSTRACT

Underserved communities lack access to existing resources that could be applied to their particular needs. In this paper, the development of a multipurpose portal, the eD Pool, is discussed. The eD Pool serves four main purposes. First, the portal is a shared repository of resources specializing in electronic development issues. Second, communities, organizations, and individuals use the portal to pool their expertise to design, develop, maintain, and sustain the pool. Third, the eD Pool serves as a communication center, where all involved have access to both the pool content and the pool users. Fourth, given the first three components, communities which generally only receive aid may also become active providers of aid due to a new circumstance I call the Pool Effect.

Keywords

Pool, Pool Effect, eD Pool, portal, repository, accessibility, electronic development, participatory, collaborative, underserved communities.

1 INTRODUCTION

Technology facilitates the generation of innovative tools. Many entities, independently or in collaboration, are coming up with more resources to aid underserved communities. Nevertheless, an ever-growing accessibility gap translates into wasted effort, ideas, and resources because potential end users do not know of the existence of these resources or cannot access them. Some of these resources are applied in an isolated manner to solve specific problems, even though their benefits could be extended.

eD Pool, the electronic development portal described in this paper, contributes to bridging the accessibility gap, reducing dependency on developmental agencies, making better use of underused resources and, in general, triggering community self-efficacy, community self-help, and inter-community help, expected phenomena that I have here termed the Pool Effect. Next, in the Problems and Objectives sections, I present the four main issues of this paper.

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1.1 Problems

In the existing conditions of underserved communities concerning eD technology, I identify four main problem areas:

1. Underserved communities lack much needed resources, although these resources may well exist and may well be 'available,' though inaccessible. For examples, see Existing Resources under the fourth section titled Approach.
2. There is an accessibility gap of existing resources due to incomplete collaboration among all interested parties, not necessarily due to a lack of availability, means, expertise, capability, willingness, or receptivity.
3. There is a communication gap, which, among other things, hampers needed collaboration.
4. Individuals, organizations, and underserved communities themselves are latent sources of aid that, provided the right medium, can realize their potential, see their self-efficacy, help their community and help others.

1.2 Objectives

To improve upon these problematic conditions, I propose the development of a portal that provides:

1. A Resource Pool specializing in electronic development issues.
2. A Participatory and Collaborative electronic development (eD) Pool, that attracts communities, organizations, and individuals to pool their expertise to design, develop, maintain, and sustain this eD Pool.
3. A Communication Center capable of giving everybody access to every item and to everybody else on the Portal.
4. The Pool Effect, which can turn receivers of aid into providers of aid.

The achievement of this fourth objective is the ultimate goal of this proposal as it is a scalable mechanism for addressing the problem of access.

2 MOTIVATION

In this section, I briefly relate how a particular community's case motivated the pool idea.

2.2 The Coatepec Community

In the summer of 1999, I participated in a social work project coordinated by Mexico's Secretariat of Social Development. One of the project's goals was to empower

the people of Coatepec, an underserved, agricultural community of 675 inhabitants in a remote location in the mountains of the State of Puebla, Mexico.

2.3 Self-Diagnosis Methodology in Coatepec

The work done in Coatepec was based on a methodology named Participative Rural Evaluation Process [13]. This project aimed at getting the community to carry out a “self-diagnosis,” that is, to produce a record of its history, customs, geography, resources, needs, production sources and potentialities, as well as of its problems and their causes and alternative solutions (see Appendix 1).

The methodology required community involvement and participation so that its members did their best to accurately provide the necessary information.

Our job was to mingle with them and to elicit and gather the information and to organize it, classify it, systematize it, and produce a formal document with all the processed information.

2.4 Coatepec’s History

Coatepec’s history and the following sections are of particular relevance to this paper. For many years, Coatepec has welcomed and tried out suggestions, plans, and programs of an internal or external origin. They have experimented with water resources, agriculture, production, education, and healthcare.

2.5 Coatepec’s Know-How

Once, when I was asking about their corn production process, Don Nachito told me, “It is definitely not the same to hear about how to do something, and to see how to do that something, and to actually do that something.” So, he took us to where some people were sowing corn, and invited us to try doing it ourselves. We had to *actually* learn the skills of making holes with our toes, dropping the seeds exactly inside the hole, and covering the hole back with the side of the foot while keeping the seeds all inside.

Every day more of their young population are moving to the cities. Many dream of attempting the risky crossing of the border to the USA; some actually do it. The community has become dependent on the money that those who left, and can afford it, send back.

2.6 Coatepecans’ skillful activities

Due to lack of time, we could not go deep into all their processes and details but Coatepecans were very knowledgeable in many areas.

2.6.1 Art/Crafts

The community is losing these traditions since their youth are no longer interested in making crafts, because they take too long to make, require too much experience, skill, creativity and natural resources and sell at too low a price.

The most common art/craft processes in Coatepec are the following.

Women, the weave palm leaves into *petates* and *tenates*. *Petates* are mats on which they sleep. *Tenates* are soft and smooth basket-like containers where *tortillas* are placed as soon as they are removed from the pan to

keep them warm at mealtime. Both their *Petates* and *Tenates* are visually attractive and useful.

Men, the weave expandable nets (bags for carrying or keeping goods) and ropes made from the natural fiber of a cactus called *Maguey*. The process is ritualistic and the production is limited to monthly intervals. The *Maguey* must be cut in a special way in the period that begins two days after a crescent moon and ends two days after it wanes, so that it keeps on sprouting. You should not cut more than five *pencas* (sprouts) per cactus. Once it is cut, it is treated by manual processes until the fiber is extracted. After it is sun-dried, the process of weaving starts. It can take up to a month to make a single net. A net is a combination of weaving and of making special knots that require skill and patience. A net sells for about five dollars if skillfully crafted. Don Marcial, 90 years old approximately, pictured below, is the only one left in the village who knows the process and still manufactures the nets. He stated that though it was cheaper and easier to get plastic ropes and bags, they are ugly.



Fig. 1 Don Marcial and his nets.

2.6.2 Agriculture

Most of the agricultural production in Coatepec is for self-consumption. Their diet is based on corn (*tortillas*) and beans. Some products that are for selling are avocado and *pitajaya* (a kind of prickly pear).

Mezcal is a strong alcoholic beverage made from a cactus. The know-how (and secret variations) of the processes is transmitted from father to son. Most of the tasks are done either by hand or with rudimentary tools.

2.6.3 Farming

Coatepec’s farming is based on goats and cows, and a few chickens and turkeys. They know how to shelter and feed them, about their frequent sicknesses and cures, fertility periods, and processes to prepare their meat for preservation and for cooking a variety of dishes.

2.6.4 Health

The introduction of medical assistants to aid the community is recent. These assistants, usually women, are trained with basic concepts and skills required in medical services, such as health, kinds of contraceptives and their uses, vaccines, some illnesses, and baby care.

However, *parteras* (midwives) have traditionally been relied on for matters concerning pregnancy, and giving birth to babies. They know about positions, cares, movements, beliefs, methods, strategies to help women give birth. Listening to them could be scary for people who are used to hospitals and doctors, but entire

communities are born that way. When someone is bitten by a snake, when sick, and when unusual needs arise, midwives are sought. These experienced people are knowledgeable in the uses, properties and types of antidotes, plants and herbs needed to cure infections, burns, injuries, and, even broken hearts.

2.7 Community Assemblies and Infrastructure

I participated in several of their community assemblies and took notice of how they discussed ideas. Participation, apparently, was not limited by age, gender, social nor economic status. A willingness to volunteer in different ways or accept assignments was never lacking [9]. Such organization and drive explained how three years earlier they had gotten their only access road broadened to allow the passage of motorized vehicles and a year earlier they had built their brick-and-concrete elementary school and installed their one telephone line.

Three years later, little else has been accomplished.

2.8 Their Openness and Willingness

Nevertheless, a community member told me that their openness and willingness to keep on trying has not slackened.

2.9 Dissimilar Communities

Though, many communities may be, for different reasons, reluctant, or unable, to try out certain proposals, this is, to me, clearly not the case of the Coatepec community.

2.10 Generalizing from Coatepec's Case

Coatepec's case is surely similar to that of thousands of communities in the world, regardless of ethnicity, culture, and geography. These communities must have the willingness, expertise, and infrastructure necessary to solve their own problems, and maybe those of others, given the right circumstances. Cavallo's Thai experience is a case in point [7].

2.11 Pooling is the Solution

My experiences with this community motivated me to reflect in the following way:

- 1.- If there are communities with the necessary willingness, expertise, and infrastructure, and
- 2.- If there are specialized resources, individuals, organizations, and institutions devoted to aiding these communities, then
- 3.- There must be a way of *pooling* it all to obtain more and better results.

Thus, the proposal of developing an eD *pool* and fostering its resultant *pool* effect.

In the remaining sections, I elaborate on both concepts.

3 APPROACH

In this section, I present general and specific features of the approach I have adopted. These features are very much in tune with the modern day thinking of Bender and of Cavallo, who in turn adopt Papert's views [2 & 7]. Their projects have one aim in common: to better serve the end user –the customer, the client, the consumer, the student, the individual, the community. And to do so, they go into the social constructionism epistemological paradigm where social, historical, communication, and educational issues

are taken into account to compellingly justify bold views where the individual entity is best served when it, sooner or later, directly or indirectly, is doing the steering and not just riding in the passenger seat. Walter Bender states that in the "news-as-service model... the consumer of news is an active, engaged participant," that the model

"...becomes a part of the social fabric within communities, a catalyst for creating communities of interest, and a means of facilitating community insight. [...] becoming acquainted with one's neighbors is an act of extending one's self. Computer networking is a technical tool that can support this endeavor. However, the network is not the active force; the people are."[2]

3.1 Involvement Approach

I adopt what I have termed an 'involvement approach' for the following reasons.

1. **Community Involvement:** Involved communities are committed to and responsible for decisions and actions regarding their empowerment.
2. **All Involved, All Committed:** All participating parties, whether they are 'insiders' or 'outsiders,' individuals, organizations, institutions, or governmental agencies, should feel involved and committed.
3. **All Committed, All Strive:** Thus, all involved parties strive to actively gear processes towards desired results.
4. **Bi-directional Involvement:** We obtain better results if we gradually achieve profound and bi-directional internal and external acknowledgement, acceptance, and involvement.

3.2 The Insiders and Outsiders Dichotomy

A tricky issue is that dichotomies are not necessarily mutually exclusive.

With each specific community and with each specific implementation attempt, the following dichotomy must be taken into account.

- 1.- **Integrative Involvement:** The insider-outsider dichotomy is sometimes minimized, giving way to more shared perceptions and views, and, in certain ways, to a more profound understanding, to more relevant undertakings, and to more lasting results or processes. The downplaying of roles or of differences can take place unintentionally or intentionally (ethno-methodology). True integration to the community allows for a more objective perception of its ways, needs, and strengths.
2. **Directive Involvement:** Nevertheless, sometimes the opposite is true. The detached and distant external expert is deemed more of an authority, more objective, or more professional. The role of 'knower' and of 'director' is expected of her. Consequently, her suggestions, ideas, and projects are more welcome, and therefore, could have better chances of success. This attitude is due to a complex tangle of social, cultural, historical, and "schooling" factors, to mention only a few.

The Directive Involvement position is pervasive. We cannot just ignore it. Reasoning about it and denouncing it have not yet succeeded in converting the masses. There are

few cases of success of the Integrative Involvement position.

Nevertheless, I submit to the Integrative Involvement position.

In reply to: believe we must keep on practicing it, and increasing the amount of successful cases of the Integrative Involvement position while developing a stronger theoretical basis in its favor. But to do this, each case has to be experienced, and dealt with not only innovatively but strategically, that is, we may have to give in a little –or a lot– yet remain true to our preferred approach, hoping that time, work, and ingenuity will improve both theory and practice.

The work in Project Lighthouse, while only a very rudimentary beginning, provides hope for the possibilities of change. All areas have a wealth of expertise. We now have better potential to enable people to take control of their own learning, their own environment. We now have an improved potential to learn and to develop in accordance with the wishes and the cultures of local areas. What is required are changing mindsets and the will to try.

David Paul Cavallo[7].

Communities must trust that we believe in improving their ways, in their own way, and, as much as possible, on their own. For example, in the Coatepec Project, the whole process was close relationship, induction, and reinforcement among the community, the project, and us. They really made us feel at home. The process we followed is outlined in the Participative Rural Evaluation Workshop Methodology used in Coatepec (Appendix 1). This methodology can be adapted to the necessities of other communities.

The eD Pool concept implies the latest in computer technology. Yet it is also a participatory and collaborative undertaking and we must keep Papert’s view in mind, that “if you want to understand (or influence) the change, you have to center your attention on the culture –not on the computer” [12].

3.3 Characteristics of the eD Pool

In this section, I address the following four issues: Sharing Resources, Participatory and Collaborative Effort, Communication and Access, as well as Quantitative and Qualitative Gains, and several other fundamental issues.

3.3.1 Sharing Resources

The eD Pool will be a shared depository of existing resources, and of developing resources, while developing new resources for upcoming needs or undeveloped solutions. Selected existing resources can be classified and mapped in many different ways into the eD Pool. Classifications can be by force (social, political, economic, commercial, and technological), sub-forces (education, health, and rights), type (ideas, methodology, funds, materials, and devices), collaborator, inter-resources, and sharing. Information concerning resource flow will be available. For more on this, see the selection

of resources that can become part of the eD Pool, in Table 1.

Distributed Computing <i>SETI@home, distributed.net, Global Grid, Folding@net, Entropia</i>
Online Collaboration Tools <i>Lotus Notes, Microsoft NetMeeting, Groove, PTC, DOME</i>
Personal & Community Publishing <i>FishWrap, Pluto, Wiki Wiki Web, MovableType</i>
Open Source Software Repositories <i>SourceForge, Savannah, FreshMeat</i>
Repositories for Sustainable Development <i>World Bank Development Gateway, SD Gateway, Honey Bee</i>
Open Knowledge and Peer Communities <i>Slashdot, Open Directory, Project Gutenberg, Wikipedia, OpenLaw</i>
Converge of Distributed Design <i>ThinkCycle</i>

Table 1: Collaborative tools and knowledge repositories (from Sawhney [14].)

3.3.2 Participatory & Collaborative Effort

Communities, organizations, and individuals pool their expertise to design, develop, maintain, and sustain the eD Pool in a participatory and collaborative manner, attempting the integration of all projects, but allowing for required modifications to meet the necessities of specific communities.

3.3.3 Communication & Access

The eD Pool is also a communication center where all involved can have access to every member and every item in the pool, enabling learning from each other’s pursuits, endeavors, and achievements. Technically this is feasible, and it has been achieved in different ways, with different advantages and drawbacks, e.g. Mail Lists, repositories, tools for collaboration, online community builders, purpose-oriented devices, chat rooms, the World Wide Web itself. It will be up to the eD Pool members to decide on and design the architectural features.

3.3.4 Quantitative and Qualitative Gains

It is expected that the pool will generate the Pool Effect, which due to complex interactions, will manifest itself in two ways; there will be a quantitative gain, and there will be a qualitative gain.

The Pool Effect can be seen as the sum of the resources used plus the synergy of the resources working together. Another way of conceiving the pool effect is simply as a catalyst that triggers a reaction which takes place due, completely or partially, to its presence.

The Pool Effect encompasses both the quantitative and qualitative gains, but, for simplicity, the qualitative changes will be referred to as the Pool Effect, and the quantitative ones as the Metcalfe Effect and the Ripple Effect.

There are two kinds of quantitative gain. One can be seen as concentration, the Metcalfe Effect, while the other, as expansion, as radiating outwards, the ripple effect.

3.3.4.1 The Metcalfe Effect

The increase in gain can simply be attributed to improved accessibility, and to the fact that as the number of participants in the pool increases there is a quadratic increase in the number of possible combinations of interaction among the elements. The Metcalfe Effect states “that the value to users, and thus self-sustaining demand for the network, will only be substantial when a sufficient number of interrelated groups are connected... When entire rural regions are networked, so as to connect communities to their neighbors, families, friends, governments, markets, and intermediaries, regardless of where they are, true value can be delivered”[6].

3.3.4.2 The Ripple Effect

If things are done right, a beneficial ripple effect should be triggered; that is, a community’s successful eDevelopment moves should directly or indirectly be of use to other communities. It is expected that the communities with the applied solution will try to share with others their new acquisition by convincing them of the obtained benefits. On the other hand, other communities, noticing the increased development of a community may want the same opportunities. Good concepts and actions can be contagious, in easy, rapid, and far reaching manners.

At present, a respectable amount of experts agree, in general, that these communities should be empowered to make use of their unique and valuable knowledge to bring out solutions to their own problems [8].

However, apart from these important quantitative aspects, it is worth elaborating on the qualitative nature of the pool effect that can be brought about by novel happenings.

3.3.4.3 The Pool Effect

My Coatepec experience tells me that there are communities with long histories of openness to experimentation and, therefore, considerable expertise in attempting solutions to their problems, in getting no, little, or much success out of plan a, b, or c.

For example, if community A once made experiment E and then learns that community B is going to make experiment E, community A can tell Community B of known drawbacks or benefits of experiment E.

This makes community A also a provider of expertise and not only a recipient of external expertise.

It is reasonable to expect that the members of the pool will begin to perceive themselves, and each other, from different angles. It could be that communities who were considered ‘recipients’ only had always been potential resources, potential providers of ‘expertise.’ It can be said that a given community possesses a certain degree of expertise because its very existence means that it has intelligently managed to cope with its environment, it has discovered ingenious ways, it has invented ingenious artifacts, it manifests itself in unique manners, it has experienced failure and success on many different occasions. Therefore, the pool effect can, in part, be

regarded as the discovery or surfacing, and sharing of the expertise that the communities themselves possess.

Therefore, the pool effect can, in part, be regarded as the discovery or surfacing, and sharing of the expertise that the communities themselves possess. I here extend Bandura’s definition regarding an individual’s self-efficacy to that of a community’s self-efficacy: “the belief in one’s capabilities to organize and execute the sources of action required to manage prospective situations” [1.]

In triggering the pool effect, the Metcalfe Effect and the ripple effect both play important roles because there is more interconnectivity and more participation, more quantity, more quality, that is, a more efficient cost-benefit ratio.

The Pool Effect must be actively pursued, both to insure it will take place and to oversee its development.

3.3.5 User-friendly Interface

The eD Pool must have a user-friendly interface so it can reach a wide range of underprivileged people. Many end-users will have insufficient reading, writing, and computer skills. As Bender mentions, “systems [should be] based on the user’s interests, taking into account the user’s knowledge level and style preferences”[4]. It is now technically possible to achieve this by, when needed, implementing icon, voice-audio, video, graphic, or other interfaces with changeable personalization options.

3.3.6 Overcoming Language Barriers

At first there may be language constraints. Individuals, organizations and institutions, willing to help might be faced with communities that do not speak or understand their language. Neighboring communities may speak different languages or dialects. Illiteracy (reading and writing) might be a kind of language barrier as well ‘computer illiteracy.’ However, this barrier can be overcome gradually or in big leaps, depending on the architecture of the eD Pool, on degrees of involvement, and on future developments. Overall, there is no limit to how far reaching the social impact can be nor to how universal its accessibility can be.

3.3.7 Sustainability

This proposed eD Pool site must be developed in such a way as to make it as sustainable as possible. In this case, it means that each participating community is responsible, to a certain extent, for the maintenance and updating of its own means. Of course, outside expert advice and help must always be available.

3.3.8 eCommerce

Many rural communities have little notion of the outside world as their potential market. And if they envision it, most of the time they do not have the know-how or means to identify other people’s necessities, nor to adapt their products to what other cultures would like to have or may use. Some other factors are 1) how to show and sell their products to the final buyer; 2) weather-dependency and resultant loss of production or of quality; and 3) intermediaries taking advantage of them. Applying eCommerce solutions, which are relatively easy to learn

and implement, may produce more satisfactory results. The Local Economy Trading Schemes (LETS) [11] could be applied depending on the results obtained from the community's self-diagnosis and feasibility of implementation.

3.3.9 Hardware Needs

The eD Pool can be reached by any party with temporary or permanent access to the necessary hardware needed to get on the Internet. However, it is a fact that, at present, most underserved communities do not possess, have access to, or know how to use these tools. In these cases, external organisms can select some communities and collaborate with each one so as to carry out more traditional self-diagnosis and self-improvement projects (See Coatepec Development Project [9]). As soon as possible, each one of these communities must show up at the eD Pool --through intermediaries if necessary-- bring geographic, historical, and needs information about itself, and begin to interact in the pool. Once the selected communities have obtained the necessary know-how, they can share it with neighboring underserved communities to aid them to participate in the global development. Obtaining the necessary hardware can lead to efficient levels of eCommerce.

3.4 Implementation considerations

In previous sections, I have mentioned motives, assumptions, and characteristics that must be taken into account to adequately implement the eD pool and to foster the pool effect. In this section, I bring together various implementation considerations, elaborate further, add other considerations, and present the Task Force Implementation plan.

3.4.1 Willing Communities

The approach I suggest would be to begin the implementation of the eD pool with the more willing kind of communities, such as the Coatepec community mentioned above, hoping the less willing communities will be eventually encouraged to join, as is discussed in the Ripple Effect section.

3.4.2 Warmth

A given community's openness to experimentation does not mean that we may disregard being tactful, and more so when introducing eD technology, or as Kartik Vora advices, "cold technologies need warm processes" [15.]

3.4.3 Build on Strengths

Warmth may be achieved by first targeting communities that also have strengths and not just weaknesses: willingness and at least a minimum infrastructure, already available or easily obtainable, e.g. a school could supply part time or full time office space [6].

3.4.4 Participatory and Collaborative Presence

Participatory means *decisive presence of an individual entity*. Collaborative means *decisive concerted action of more than one individual entity*. Both terms, and their meanings, are indispensable in the eD Pool idea. In addition, there may be members of a pool who neither participate nor collaborate, but just 'belong' to the pool. These members are welcome also; eventually they will

play collaborative and participatory roles. Nevertheless, this distinction must be kept in mind, because the essence of my proposal requires participatory and collaborative participation, especially at the initial stage of the eD Pool.

3.4.5 Interdisciplinary Undertaking

To adequately integrate the digital environment into a certain community's reality, interdisciplinary work is needed, as well as the cooperation of different organisms, in order to better handle the integration of their differences, to complement each other (see eD Model [10]).

3.4.6 Implementation Task Force

Taking into account the complexity of the task, an implementation task force is in order. The following steps would, in broad terms, be necessary to get the eD Pool started.

- Make up a Task Force of invited or volunteer institutions, organizations, communities, groups, and individuals.
- Have Task Force create documents, forms, and templates for the next item of this plan.
- Submit proposal to an initial selection of institutions, organizations, communities, groups, individuals inviting them to sign up to the eD Pool and to supply feedback, funding, expertise, infrastructure, hardware, software, personnel, volunteers, and other contributions.
- Have Task Force analyze the input and decide on next steps.

4 BENEFITS

The most important benefits of the eD pool will be:

- To facilitate worldwide eD focused sharing and learning,
- To encourage entrepreneurial projects, which will better serve communities' necessities.
- To give communities a voice in decision making processes.
- To empower underserved communities and to foster inter-community support.

5 CONCLUSION

In conclusion, motivated by my Coatepec experience, I have proposed the creation of the eD Pool, a multipurpose portal which would be

- A Container of Resources,
- A Collaborative Undertaking,
- A Communication Center, and
- A Trigger of New Resources.

The development of the eD Pool will not only give us better access to and better sharing of available resources but will pave the road to the pool effect, the surge, discovery or creation of new and better resources, because the receiver of aid can also be a provider of aid, because

"The process has begun, and it is indeed a paradigm shift: the consumer is becoming a creator."

Walter Bender.

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REFERENCES

- [1] Bandura, Alfred. *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall. 1986.
- [2] Bender, Walter et al. "Enriching communities: Harbingers of news in the future." *IBM Systems Journal*: Vol. 35, NOS 3&4 (1996), 369-380. Available at: <http://www.research.ibm.com/journal/sj/353/sectionb/chesnais.pdf>
- [3] Bender, Walter. "Learning and Expressing." *IBM Systems Journal*: Vol. 39, NOS 3&4 (2000), 683-684. Available at: <http://www.research.ibm.com/journal/sj/393/part2/bender.pdf>.
- [4] Bender, Walter. "Twenty Years of Personalization: All about "Daily Me"." *EDUCAUSE Review*. Vol. 37, Number 5 (September/October 2002), 20-29. Available at: <http://www.educause.edu/ir/library/pdf/erm0251.pdf>
- [5] Bender, Walter. (personal email, January 29, 2003.)
- [6] Best, Michael and Maclay, Colin. "Community Internet Access in Rural Areas: Solving the Economic Sustainability Puzzle." CID at Harvard University: *The Global Information Technology Report 2001-2002: Readiness for the Networked World*. 76-88. Available at: http://www.cid.harvard.edu/cr/pdf/gitrr2002_ch08.pdf
- [7] Cavallo, David. "Technological Fluency and the Art of Motorcycle Maintenance: Emergent Design of Learning Environments." Doctoral Thesis at MIT, February, 2000. Available at: <http://web.media.mit.edu/~cavallo/Thesis-index.pdf>
- [8] Digital Nations Web Page, Available at: <http://dn.media.mit.edu/>
- [9] Gomez-Monroy, Carla and Solis-Fuentes, Anitzia. "Coatepec Community Development Project". July 1999. Available at: <http://web.media.mit.edu/~carlagm/papers/Coatepec.html>.
- [10] Gomez-Monroy, Carla. "eD Model: Towards a general eDevelopment model for different communities." January 2002. Available at: <http://web.media.mit.edu/~carlagm/papers/eDmodel.html>.
- [11] Local Economy Trading Schemes. Available at: <http://www.gmlets.u-net.com>.
- [12] Papert, Seymour. "Computer Criticism vs. Technocentric Thinking." M.I.T. Media Lab Epistemology and Learning Memo No. 1, Cambridge, MA. (1990).
- [13] Proceso de Evaluacion Rural Participativa: Una Propuesta Metodológica (Cuadernos del Programa de Manejo Participativo de Recursos Naturales) Instituto de los Recursos Mundiales & Grupo de Estudios Ambientales A.C. México, agosto de 1993, 81-100. Available at: <http://www.preval.org/php/docbiblio/doc3dde91985a85c>
- [14] Sawhney, Nitin. "Cooperative Innovation in the Common: Rethinking Distributed Collaboration and Intellectual Property for Sustainable Design Innovation." Doctoral Dissertation Defense at MIT: November 25th, 2002. Available at: <http://web.media.mit.edu/~nitin/thesis/nitin-defense.ppt>
- [15] Vora, Kartik. "Review of Pool Effect." Peer Reviews for ThinkCycle Publications. November 4th, 2002. Available at: http://www.thinkcycle.org/tc-reviews/?refer_id=37911

APPENDIX 1: Participative Rural Evaluation Workshop Methodology used in Coatepec



