# ICT Based Learning Community: empowering socio-economically disadvantaged people

**José Armando Valente**[i], *jvalente@unicamp.br*
Department of Multimeios and Nied, Unicamp & Ced, PucSP

## Abstract

The objective of this article is to present the concept of an ICT based learning community, to describe two computational tools, audio and video, that were integrated into the ICT, and to show how these communities can be used with subjects who are considered digitally and socio-economically excluded, such as the elderly, adolescents, community health agents, and to implement the concept of a learning city. One of these examples is described in more detail.

This work is part of a research project that is taking place at the Lipacs (Laboratório Interdisciplinar de Pesquisa-Ação para Comunidades Saudáveis – Interdisciplinary Action-Research Laboratory for Healthy Communities), sponsored by Fapesp, set up at the Media Department, Art Institute, at the State University of Campinas (UNICAMP), Brazil.

The creation of an ICT based learning community is supported by several concepts such Wenger's concept of communities of practice, Freire´s educational principles and Papert's constructionism ideas. When people construct a product using ICT, and understand how they have done it, they can experience the feeling of empowerment - the sensation of being able to produce something that has been considered impossible.

The target population working with Lipacs is composed of people with a low level of schooling and difficulties with reading and writing. In order to help these people to be engaged in activities developed in an ICT based learning community we implemented audio and video facilities in the learning management system (LMS) used by the project (Tidia-Ae). Thus instead of communicating through written text, community members can use audio and video to express their ideas. The ICT based learning community was implemented as part of 4 projects:

- Literacies with the elderly – aiming to investigate how elderly people who are considered excluded from the digital world use ICT for the construction of new literacies;
- Appropriation of hypermedia by community health agents – how hypermedia resources are used by community health agents, doctors, community leaders, young people and teachers to interact, to access information, to communicate and to continue their education;
- Implementing a learning city – creating situations that can foster personal, social, professional, cultural and economic development for citizens, so it can become a learning city;
- Preparing adolescents for the world of work – the goal is to build a sense of empowerment based on mathetic and aesthetic experiences provided by the development of multimedia projects. This particular example is described in depth, showing how these adolescents are using the ICT to promote their digital inclusion and their inclusion into the world of work.

In all these examples it was possible to observe that different community members are incorporating ICT into their practice and doing things that are meaningful to them, as well as being empowered by this experience.

## Keywords

ICT, information and communication technology, learning community, digital exclusion, technology in education, learning process, empowerment

# Introduction

The objective of this article is to present a theoretical framework for a series of projects related to the creation of an information and communication technologies (ICT) based learning community; to briefly present the development of two computational tools that are helping the creation and support of ICT based learning communities; and to show how these communities can be used with subjects who are considered digitally excluded and socio-economically disadvantaged, such as the elderly, adolescents, community health agents, and to be used to implement the concept of a learning city. The example with adolescents is described in depth.

This work is part of a research project that is taking place at the Lipacs (Laboratório Interdisciplinar de Pesquisa-Ação para Comunidades Saudáveis – Interdisciplinary Action-Research Laboratory for Healthy Communities), sponsored by Fapesp[ii], set up at the Media Department, Art Institute, at the State University of Campinas (UNICAMP), Brazil. The main goal of this research is to develop computational tools that facilitate the creation of ICT learning communities so people who are considered digitally excluded and functionally illiterate can have access to these technologies, use them to solve problems, to learn and to communicate. Four graduate students are developing their studies in this area respectively working with elderly people, community health agents, adolescents at risk, and one student is working with the concept of learning cities, setting up learning activities involving residents from a small town[iii].

The creation of an ICT based learning community is supported by several concepts such Wenger's concept of communities of practice (Wenger, 1998), Freire´s educational principles and Papert's constructionism ideas. After presenting the theoretical framework that supports the creation of an ICT based learning community, two computational tools will be described, that were developed to help functionally illiterate people to use ICT facilities, followed by four examples to illustrate how these communities can be implemented involving different populations, in different settings and with different educational objectives. These examples show how particular populations can construct knowledge by participating in an ICT based learning community and how this knowledge can empower each community participant. The goal of the work is not only to create conditions for people from these different populations to have access to ICT but, in the process of using these technologies, to experience the feeling of having powerful ideas, as proposed by Papert (1980), to be conscious of the knowledge constructed, and to be able to use this knowledge to act and help to transform the environment where they live, as proposed by Freire (1975).

In these ICT based learning communities the knowledge construction process is based upon Papert's constructionist ideas, since the subjects are using ICT to produce concrete object (Papert, 1986; 1992). The availability of computationally-rich construction materials can afford these people the opportunity to experience the empowerment associated with the feeling of learning how to use ICT and having wonderful ideas (Stager, 2003; Valente, 1999). Considering that the subjects participating in these studies have very little experience with ICT and limited ability to read and write, the empowerment feeling is even deeper when they are able to produce something that was considered impossible. They are proud of their work, show the product to everybody and are very happy to exchange ideas about what they have done. Thus the ICT have a very important role in the creation of these learning communities.

# The foundations of an ICT based learning community

The concept of an ICT based learning community was developed using different concepts that were proposed independently. The first contribution was the concept of community of practice. This term was first used in 1991 by Jean Lave and Etienne Wenger in their work related to situated learning when they first proposed the idea that learning could be a process of

participation in communities of practice. They noticed that learning did not have to be strictly related to school, but could be social, and developed from our experience of participating in daily life (Lave & Wenger, 1991). The emphasis was in the social practice, the “doing in a historical and social context that gives structure and meaning to what we do” (Wenger, 1997).

As mentioned by Wenger, communities of practice can take different forms and they can vary along a number of dimensions, although they must preserve a few essential characteristics such as: the domain, a community of practice is focused on a domain of shared interest; the community, which is formed by the fact that people are pursuing their interest in their domain, creating the opportunity to engage in joint activities and discussions, to help each other, and to share information; and the practice, since members of a community of practice are practitioners. They develop a shared repertoire of resources such as experiences, stories, tools, and ways of addressing recurring problems— in short, a shared practice. (Wenger, 2001)

The concept of community of practice has varied over the years and is now used to define "groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (Wenger, McDermott & Snyder, 2002, p. 4). However, as pointed out by other authors, a community of practice is much more complex than a network of informal relationships or communities of interest where members interact and exchange information. In a community of practice participants work collaboratively to enhance their practice and to do so they exchange information, reflect on what is proposed by peers, build knowledge, apply this knowledge to improve their skills and consequently improve the activities they carry out as part of their practices (Saint-Onge & Wallace, 2003).

Another important concept was "virtual community" proposed by Howard Rheingold. He defined virtual communities as “social aggregations that emerge from the Net when enough people carry on those public discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace (Rheingold, 1993). These are people who are actives, who share values, interests and goals, and who assume an attitude of mutual support, through interactions in the cyberspace. Based on this idea, other authors understood the importance of virtual communities, such as Levy (1999), who proposed the creation of virtual communities as one of the three principles that guided the initial growth of cyberspace.

The dissemination of ICT was instrumental in setting up virtual communities related to the learning process. ICT offer communication facilities, allowing the participants to interact with community experts and even among the participants, creating the means for these learners to share ideas, reflect on different points of view and form communities that are working to support the process of learning. This was a very common idea among researchers working with distance education mediated by ICT who have created the concept of virtual learning communities. The fact that students are working with ICT, they should not be passive, absorbing the information received from teachers, but teachers and students should form a learning network, as proposed by Harasim and colleagues (Harasim, et al, 1995). Palloff and Pratt (1999) played an important role in developing the concept of virtual learning communities by proposing that online courses should be viewed as learning communities in cyberspace.

In our work we noticed that the constitution of learning communities does not necessarily happen only in the virtual space. Learning communities can also be established when people are interacting, helping each other and practicing whether they are working in a face-to-face situation or interacting via ICT. What is important is the fact that these people are using ICT to develop products of their interest and are interacting among themselves. Thus we have adopted the concept of an **ICT based learning community**.

Another important ingredient in the ICT based learning community is the fact that people are using ICT to develop a product of their interest. This is taken from Freire's ideas that the more the learning process is related to the interest and the situation in which the learner lives, the

better her/his chance of understanding the content and, thus, of becoming involved in the educational activities. Also based upon another of Freire's educational principles, members of these communities assume a very altruistic attitude, using knowledge they have constructed to help other members of the community as well as to transform the reality they belong to (Freire, 1975).

However, as mentioned by Wenger, the fact that there is a group of people interested in learning and they are interacting through the use of ICT in a particular learning context, does not necessarily mean the constitution of an ICT based learning community. Another important aspect to be considered is the type of learning that occurs in these communities. For example, how much they contribute to the exchange of information and how they provide conditions for the construction of knowledge.

Memorization of information and knowledge construction are part of the learning process. An education based entirely on memorization is not consistent with the proposal for a community of practice, as explained above. In order to change practices, besides information, it is necessary to have competence, defined as concepts, skills and attitudes (OECD, 2005), which are impossible to be memorized.

As observed by Piaget (1976) children are able to construct knowledge about certain concepts through spontaneous interaction with objects and people. However, the development of more abstract concepts, for example, sophisticated logical-mathematical concepts, depends on the help of more experienced people, educators as proposed by Piaget (1988). A similar distinction was made by Vygotsky. He distinguished between spontaneous and scientific concepts, the former being developed from the individual's experience with the world. The scientific concepts are developed from the spontaneous, but depend on the social interaction, especially the school (Vygotsky, 1986).

Therefore, it is illusory to think that in an ICT based learning community the process of knowledge construction happens spontaneously. This construction depends on the interaction of learners and the guidance of experts, community mediators, who know how to keep the community in action. This means helping to define themes that are compatible with the learners' interests and the expert's pedagogical intention, to adjust the difficulty of the discussion, and the problem being solved, to a level that is consistent with the zone of proximal development (ZPD) of each learner or of the community collectively. The experience with communities of practice shows that the active construction and the success of a community depend on one person or core group who takes responsibility in order for the community to develop (Wenger, 1998). This person or this group assumes the role of promoting, enabling and helping to create conditions for the knowledge construction process.

## Developing ICT facilities to be used in learning communities

The target population working with Lipacs is formed by socio-economically disadvantaged people, in general people with a low level of schooling and having difficulty reading and writing. In order to help these people to take advantage of a system to continue their learning, we implemented audio and video facilities in the learning management system (LMS) used by the project (Tidia-Ae). The use of voice and video facilitate the interaction of community members. Also the integration of these new ways of communicating into their practices, and the fact that these people are in constant contact with written words, is opening up new possibilities for them to learn to read and write and improve their living conditions.

Video and audio communication systems were integrated to the LMS so users could "talk" to the system and "listen" instead of writing and reading. Also the fact that these communication facilities are integrated to the LMS the users do not need to leave the LMS and use software external to the system for real time conferencing, such as Skype, MSN, and GoogleTalk or other

software for creating multimedia files such as Audacity, Windows Movie Maker. The integration of these software to the LMS avoids people going out of the learning environment to develop learning activities that would not be registered in the system. Also it avoids the trouble of installing these software in everyone's computers and getting people to use them. Figure 1 shows the integration of the voice system to the LMS.


*Figure 1 – audio communication system integrated to the LMS used in the project*

With these audio and video facilities instead of sending a written e-mail, for example, the user can record the message directly in the browser and send the audio file. The person receiving this message can open it and listen to the message. It is not necessary for the user to have any other software for manipulating audio files. The same functions were implemented in the forum and chat tools. A similar solution was adopted for the video facility.

These facilities are allowing several learners who were totally excluded from the digital world to be able to get familiar with these ICT and to expand their communication capabilities. This is also true for users who have no problem reading and writing but are acquiring new ways of expressing through different media such as audio, video, and image.

## The role of the ICT in the construction of knowledge

ICT are used by the community participants either as tools to develop their products in a face-to-face situation or to communicate with other community members or with people outside the community.

When ICT are used to solve problems, the learner has to apply the knowledge s/he has in order to instruct the ICT about how to solve a particular task, making explicit what s/he knows. In this sense, ICT activities become a window into the learner's thinking and knowledge. Also the interactions user-ICT can be seen in terms of a sequence of actions – description-execution-reflection-debugging-description. With the help of other members in the community or an expert, in general, the community mediator, the products can be improved, as well as the learners' ideas and practice. Thus, each of these actions creates opportunities to increment knowledge, contributing to its growth in a crescent spiral – the learning spiral – that takes place as the user interacts with the computer to solve a particular project (Valente, 2003).

The idea of the learning spiral can also be established in an ICT based learning community when the participants, learners and experts (or the community mediator), communicate online – I have called this approach "virtually being together" since the community participants can be together, side by side, although via Internet. It is highly interactive and the interactions are established in order for the expert or community mediator to help the learner to solve particular problems s/he encounters in her/his practice. These interactions allow the mediator to

continuously monitor and advise the learner so as to understand her/his interest and level of knowledge about a particular topic. In this way the mediator is able to propose challenges and to help the leaner to attribute meaning to what s/he is doing. In this situation the learner can process the information, apply it, transform it, seek new information and thus build new knowledge.

Initially all interaction is happening between the mediator and the learners. As the learners start to develop their product and interact with other community members it is possible to identify learners who know particular subjects that even the mediator does not dominate. These learners can help other colleagues and in these circumstances the ICT based learning community is formed, each working with their potentials and cooperating with each other.

In this kind of ICT based learning community each learner is engaged in a project or in a problem to be solved. In this situation s/he is producing results and reflecting upon them. If a difficulty emerges, the learner sends information (problem description, video, pictures) to the mediator. The mediator reflects upon the information received and sends back questions, articles, and examples of activities or specific support material so the learner can use this information to debug her/his project. New results can be obtained, new difficulties can emerge and the sequence of actions repeats, as shown in figure 2.

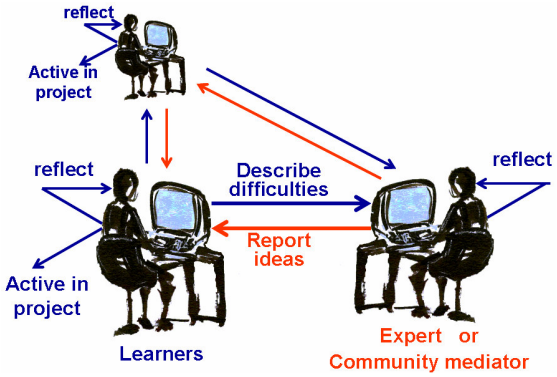


*Figure 2: Interactive cycle learner-expert in the "virtually being together" approach*

As illustrated in figure 2, the interactions are not taking place only between one learner and the mediator but all participants can interact among themselves and with the mediator. This helps to constitute a learner's network, the ICT based learning community. Everybody can see and comment everybody's work, exchange experiences, presenting different points of view for deeper levels of reflection. This learning community encourages collaborative work since learners can identify and jointly develop projects that have common backgrounds. At the same time it creates the conditions for learners to construct knowledge, fulfilling each participant's needs and interest. Each participant can use her/his working reality as a context to know more and to improve her/his practices. Thus, the learning spiral is taking place at different levels and with respect to different types of knowledge being constructed (Prado & Valente, 2002).

## ICT based learning communities in action

This section briefly presents four examples to illustrate how the concept of an ICT based community can be used with elderly people, community health agents, adolescents and for the implementation of a learning city

### Literacies with the elderly

This is a long term study, involving a group of 16 adults aged between 60 to 78 years, 14 women and 02 men, with educational background equivalent to 3rd to 6th grade level and digitally

excluded. The first important aspect of this work is the fact that the elderly is considered the age group with the greatest number of digitally excluded in Brazil (IBGE, 2008).

The second important aspect is related to the use of ICT for the construction of new literacies. The elderly belong to the "pencil and paper" culture. The question is "how do these people use ICT to expand their ways of expressing themselves by using different communication channels such as oral, written, kinaesthetic, visual and digital, according to the design of media literacies proposed by Buckingham (2008a; 2008b)?"

The results have shown that these elderly were able to develop the ability to search for information, enhance communication, increase their social network, participate in leisure activities, help other colleagues to learn, promote products made by themselves, generate content, use ICT to help domestic economy, preserve the memory, contribute to increased self-esteem and insert themselves into the digital culture with a more critical and creative attitude.

### Appropriation of hypermedia resources by community health agents

This work takes place in public spaces that provide access to ICT in the municipality of Pedreira-SP which receive people with different backgrounds and levels of schooling. These spaces are used to train community health agents as well as to work with the population to develop activities using different media in order to promote digital inclusion. The products, related to the participants' interest and working context, such as health, for example, are presented, discussed and reworked by the group and then distributed and shared with the community involved. From these activities it is possible to notice how the different tools, audio and video, are allowing various forms of expression and communication. ICT are helping "to give voice" to each participant and in this context allowing to emerge the richness of their experiences so they can be reported, discussed and made available on the network.

### Implementing a learning city

This project is providing personal, social, professional, cultural and economic development for the citizens of Sud Mennucci, first digital city in Brazil, with about 8 (eight) thousand inhabitants and with Human Development Index (HDI) equal to 0.779. The goal is for this city to become a learning city (Yarnit, 2004). The idea is to stimulate learning in various fields and promote participation and collaboration among people, and through these activities to identify skilful and talented individuals. Also a survey was conducted with the local community to identify people who want to teach and who want to learn. Based on the results of this survey, several events were organized which engaged people in learning activities on various subjects such as sports, music, cuisine, crafts, computers, reading, environment and others. These activities occurred on weekends in public spaces and they counted on their own community of teachers and learners.

The interesting aspect in this project is how communities have been established. First, the organization of these events involved the City Hall and its Departments, local business, local companies, external companies that provide services to the city and the population. Several planning meetings were carried out with various committees through video-conferences, practice that did not exist before, creating a social network so that there was constant communication and exchange of information among these committees' participants.

Second, during the events, the participation and collaboration among people of different ages, skill levels and backgrounds provided an environment for identification of talents, common interests and allowed the organization of common interest groups that are looking for establishing new business. These groups migrated into ICT based learning communities to carry out the activities that started during the face-to-face events. Some results can be observed in the city website (Sud, 2010)

### Preparing adolescents for the world of work

How to prepare digitally excluded adolescents for the world of work? One way is to develop operational competences, mechanical and repetitive, that allow the adolescents to merely get placed in a job. The other way is to value people in their differences and give them the opportunity to become autonomous and creative and, thereafter, become socially included with responsibility and political and social fairness. Valuing the youth as a whole person must include actions that facilitate the realization of their creative potential and, therefore, in developing a sense of empowerment.

This project is carry out with adolescents from 14 to 18 years old, digitally and socially excluded, as part of the Project Acreditar, developed in the city of Atibaia, State of Sao Paulo. The goal is to help these adolescents to build a sense of empowerment based on mathetic experiences (Papert, 1980; 1992) and on aesthetic experiences (Pareyson, 1993), and to promote the inclusion of adolescents into the world of work as they develop multimedia projects on issues related to work.

In this project is important to notice the role of the community mediator, emphasizing certain values which traditionally are not part of job training process. Second, to create conditions for the adolescents to reflect on what they do as part of daily activities to recognize their immense creative and operational capacities For example, groups of adolescents went around the region where they live and document living conditions as well as type of houses and what were the features that called their attention. Two pictures are shown in figure 3a and 3b. These pictures are discussed in the blog of this group (Feras, 2010) pointing out how one construction is creative and the other is poor. Similar activities were developed by other groups, looking for creative graffiti, documenting flooding in the region, and types of playgrounds.

*Figure 3a – house that was considered very poor*

*Figure 3b – house that was considered very creative, constructed with material encountered in the street*

These adolescents developed activities in an ICT based learning community using different types of digital media such as mobile phones, low cost digital cameras, and mp3. Each group created a blog to disseminate and receive comments about the work done. Also their production was stored in their respective portfolio in a LMS in order to help the processes of reflection and grasping of awareness about the action to undertake training, and simultaneously develop competences required for multiple literacies in accordance with the guidelines of OECD (2005).

## Conclusion

Several authors working with the digital inclusion agree that it is not enough to just provide socio-economically disadvantaged people with access to technology. Besides this access it is necessary to create opportunities for them to incorporate ICT into the activities they develop (Sorj, 2003; Silveira, 2003). The approach we have take in our research is to adequate this

technology with appropriate facilities, such as audio and video, and create an ICT based learning community so its members can be active practitioners, producing content for them as well helping their colleagues and use their knowledge to transform their reality.

The concept of ICT based learning community is founded on ideas borrowed from Wenger's work related to the community of practice, on Papert's constructionism ideas and on some of Freire's educational principles. Our goal is to provide community members a chance to learn about ICT, how to use ICT in activities related to their work or personal interest, to understand about the content of what they are doing, and to experience the feeling of empowerment. The examples discussed show that different community members are incorporating ICT into their practice, and doing things that are meaningful to them.

In fact, the ICT are creating circumstances for people to express themselves as a whole, expanding their capability to use different media that goes beyond written words, and through these media to be able to overcome certain difficulties such reading and writing. The resources to explore and to form networks of people interacting face-to-face or via internet have facilitated the exploration of these human dimensions, forcing us to continuously rethink our role as learner, the role of technologies in this process, and our conceptions about learning, especially when done with the help of the ICT.

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