

Empowering Rural Citizen Journalism Via Web 2.0 Technologies

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ABSTRACT

Once acquainted with the modern information and communication tools made available with the advent of the Internet, five Brazilian rural communities participating in a pilot project to develop a self-sustaining telecenter model, engaged in citizen journalism using inexpensive digital video cameras. Community members used Web 2.0 collaborative tools to post short videos on the telecenter portal. The 95 video blogs published between September 2006 and May 2008 recorded various aspects of community life, including religious celebrations, oral history arts and crafts traditions, folklore, and environmental concerns. This study evaluates the impact of video blogging in these communities.

Categories and Subject Descriptors

J.4 [Computer applications]: Social and Behavioral Sciences – sociology.

K.4.0 [Computers and Society]: General.

K.3.1 [Computers in Education]: Computer Uses in Education – Collaborative Learning.

General Terms

Measurement, Experimentation, Human Factors, Verification.

Keywords

Rural telecenters, video blog, digital inclusion, digital divide, analysis of collective practices, applications for underserved users, community informatics, ICT4D, Web 2.0.

1. INTRODUCTION

Video blogging is among the Web 2.0 technologies that became popular by the end of 2006 with the sudden popularity of YouTube. This and other video-sharing Web sites have since hosted collaborative online communities where millions of user-

generated video posts prompt comments and open discussion. Increasingly affordable and accessible media production and file sharing tools have enabled amateur video producers to share media content with Web users worldwide, spurring a new generation of citizen video reporters. Community informatics has greatly benefited from this digital revolution. Over the past decade, a growing rural telecenter movement has spread throughout the developing world. As a result, in a number of remote rural communities, where face-to-face communication had traditionally been the most prevalent form of communication, individuals can now connect to the Information Society thanks to information and communication technologies (ICT) available at their local telecenter. Few of these telecenters provide users with access to video blogging tools. Yet, in societies where high rates of illiteracy prevail, video blogging can provide a useful means of mediated oral communication.

This paper presents a case study of one such telecenter network located in a remote mountain region of South America, where rural dwellers access video production and Web publishing tools, as well as Internet connectivity. The Gems of the Earth Rural Community Telecenter Network was established in Brazil as a non-government organization (NGO) in September 2003. Its mission is to empower small rural communities and to promote social and economic development through the use of information and communication technologies meant to integrate the community in the Information Society. The Gems of the Earth NGO runs a pilot project that consists of five telecenters located in different rural villages. The goal of this project is to create a replicable model for self-sustaining community telecenters in small rural communities in Brazil. The five communities that participate in the pilot project are Conselheiro Mata, Milho Verde, Rodeador, São Gonçalo do Rio das Pedras, and Tombadouro. Each community averages a population of 1,000 residents. Each consists of a rural district within a nearby municipality, and some have their elected representative in the municipal legislative council. All of the communities are served by public elementary and middle schools, some have their own public high schools. The local economy relies primarily on retirement pensions, agricultural production, and tourism. The region achieved

notoriety as one of the richest areas of the country during the early centuries of Portuguese colonization due to diamond mining. The mining industry has since declined, and the area now ranks among the poorest in Brazil.

The article “Impact of the Insertion of Modern Information and Communication Technologies in Brazilian Rural Communities” [20], presented at ICTD2006, in Berkeley, California, introduced the Gems of the Earth rural telecenter case study and evaluated its impact in the pilot project. The proceedings were published as part of a Master’s degree thesis at the Federal University of Minas Gerais [19]. As a result of the presentation undertaken at the ICTD2006 conference, an outside collaborator contributed funding for the adoption of video blogging hardware and software in each of the communities. The collaborator hoped that video blogging would allow telecenter volunteers to document the everyday life of the communities and to publish an oral history that could be viewed by a global audience.

In order to reach this goal, the telecenter volunteers and the community must first engage in information appropriation, a three-step process of digital, informational, and social inclusion modeled by Ferreira and Dudziak [36]. The first phase, known as digital inclusion, emphasizes an individual’s ability to operate and communicate through the use of computers. In this phase, an individual understands how the equipment (hardware) and the application programs (software) runs, and its ability to produce, organize, disseminate and view the information in automated form.

The second phase, known as information inclusion, emphasizes cognitive processes. Its objective is to construct knowledge including the use, interpretation and search for meanings, and the creation of mental models. The construction of knowledge occurs as the individual recognizes the relationships between the various information items. Uncertainty decreases as learning occurs and the individual incorporates new knowledge according to their pre-existent cognitive structure [7]. Information systems are examined according to how they are perceived by individuals, with special attention to the understanding of how a person searches the meaning of their questioning and learning processes; in what Dervin and Nilan [1], [5] termed *sense-making*.

The third stage consists of the process of social inclusion, understood as information literacy with emphasis on the construction of the sense of citizenship that emerges from the learning process. It must include, beyond a set of skills and knowledge, the notion of values connected to social and situational dimensions. These values involve the development of attitudes and personal positions, including ethics, autonomy, responsibility, creativity, critical thinking and the learning of how to learn.

Participation in virtual communities has been linked to increased political activism, greater civic engagement and the formation of social capital [27], [32], [43]. There is evidence that activities that used to take place in real-life neighborhoods are migrating or being complemented at virtual meeting grounds, where users create, nurture, and support social bonds [3], [4], [32].

Insofar as participation in virtual communities linked to telecenter initiatives, studies have found that the creation of relevant content that fulfills the user’s information needs and complements the

roles of real world social networks contribute to the sustainability of such projects [34], [44].

The field researcher who collected the data in the pilot community of Tombadouro remarked one particular incident that confirmed the extent to which the villagers had adopted the information and communication technologies available at the local telecenter. As the researcher was about to leave the village, an elderly woman told him, “Please send us an e-mail letting us know you got home safe.” The request was remarkable not only as evidence of the affection and concern of a community member for the researcher, but also for her use of the term “e-mail,” expressed in its original form, in English, not Portuguese. The comment indicated that, despite being illiterate, the woman had adopted the technology as a communication channel. It indicated that she, as well as other illiterate members of the community, relied on e-mail communication with the help of telecenter volunteers who connected to the Internet to retrieve messages, and then communicated those messages orally to the intended recipients. This example illustrated how the community of Tombadouro had reached the later stage of social inclusion.

This study analyzes the videoblogs posted by the five communities, and describes in greater detail the content of the videos from Tombadouro, the community which produced 46% of all the video blogs published in the telecenter portal.

2. THE VIDEO BLOGGING PROJECT

The Gems of the Earth Video Blogging Project was launched during the Second Meeting of the Gems of the Earth Volunteers, which occurred on September 2-3, 2006, in the village of Tombadouro, in the northern part of the state of Minas Gerais, Brazil. The first video produced by the project depicted the meeting of the volunteers from the community telecenters of all five villages that compose the Gems of the Earth Rural Telecenter Pilot Project [17].

Two recent communication graduates from outside the communities were tested on their abilities to create video blogs and then were hired to train the telecenter volunteers. They were assigned to spend seven days at each of the five villages, to produce video blogs and train telecenter volunteers to produce and publish video content. The instructors had no formal training skills. Their goal was to teach others while they themselves experienced the process. As a result, each community produced a few videos with the assistance of the instructors. Local volunteers gradually took over production duties as they learned new skills. The instructors chose the topics of the first videos, after which the volunteers picked their own topics.

The instructors first trained local volunteers in the community of Conselheiro Mata [8], followed by Rodeador [33], Milho Verde [24], São Gonçalo do Rio das Pedras [37], and Tombadouro [40], in that order.

The equipment consisted of one digital video (DV) camera, with an average cost of two hundred and fifty U.S. dollars, connected to a personal computer (PC) at the telecenter through an IEEE 1394 (Firewire) interface card, which cost on average thirty U.S. dollars. The telecenter computers ran a recent version of Ubuntu Linux and Kino video production open source software. The video production process consisted of selecting a topic, creating a

shooting script, capturing the images and audio of interviews or narration, importing video and audio from the camera into the computer, selecting the appropriate shots for a three-minute long video, adding graphic titles, editing scene transitions, incidental music and credits, uploading to YouTube or Google Video, and finally posting a link to the video blog and an explanation of the video content on the Gems of the Earth Web Portal (www.gemasdaterra.org.br). The rural telecenters are connected to the Internet through a VSAT satellite antenna capable of 256 Kbits/sec download and 128 Kbits/sec data upload rate.

The Gems of the Earth Web Portal was redesigned to accommodate embedded video blogs. A special category was created to organize the video blogs in the portal's Phpnuke implementation, which utilized the MySQL database, running Php on an Apache server under Linux. A direct link to this category, named *TV Gemas da Terra* (Gems of the Earth TV), was included in the portal's main menu, under the menu item *Comunidade* (community), and the sub-menu item "video blogs". A click on this link opened a list of all published video blogs [14]. The video blogs were also organized by community, so that all video blogs from one specific community could be selected on the menu tab *Noticias* (news), under the sub-menu tab *Tópicos* (topics), and the name of the community [13]. The news items with a heading *TV Gemas da Terra* contained video blogs published by the community. The portal also displayed a full archive listing the number of views and number of comments received by each post or video, as well as user-generated ratings [11].

3. METHODOLOGY

This study pursued a qualitative research approach, which as described by Minayo [21] is characterized by its mutating and dynamic aspect, where "individuals and groups and the researchers are dialectically authors and characters of their historic time." The researchers selected the technique of semi-structured interviews, in which according to Laville and Dionne [6], "the themes are specified and open questions are formulated previously, but total freedom is permitted concerning the repetition of some questions, the order in which the questions are made, and the addition of improvised questions."

In order to assess the impact of the video blog project, researchers visited the community of Tombadouro in August of 2008 to interview the video bloggers and the villagers who participated in the project. The interviews took place at various locations, among which the community telecenter, the school, the rural workers' cooperative, the main village square, and in the homes of individuals who participated in the videos. The interviews were recorded and later organized sequentially and by themes, as described elsewhere in this article.

The researchers also conducted a content analysis of all the video blogs (n=92) posted on the Gems da Terra portal between September 7, 2006 and May 7, 2008. The classification scheme used in coding measured dimensions of diversity based on a modified version of the model proposed by Hoffmann-Riem [16] and McQuail [23]. The content was examined for topics, the representation of different ethnic groups and gender, and geographic coverage and relevance [22].

The coding scheme identified the community covered in the videos, their length (duration in seconds), the location where it was shot (exterior, interior, or both), and the two main subject matters or topics contained in each piece. It also identified the first two actors (a person, or an entity, organization, agency, etc.) specifically mentioned by the reporter or by another source in the story. Actors (n=151) were categorized according to whether or not their image appeared on screen and whether or not their voices were heard. The gender and ethnicity of each actor was identified where visible and applicable. As for the reporters (n=85), only their gender and ethnicity were coded.

Two coders independently analyzed one-tenth of the video blogs sample to establish inter-coder reliability. The coders were native Portuguese speakers who underwent two virtual training sessions and never met in person. Coding decisions about 14 different criteria in each of the ten videos generated inter-coder reliability of 80.71%.

4. CITIZEN REPORTING IN TOMBADOURO

The community of Tombadouro was introduced to the concept of the video blogging project during the Second Meeting of the Gems of the Earth Volunteers [17]. A few weeks later, the video blogging instructors spent an entire week with four volunteers they met at the local telecenter. The instructors trained the volunteers through presentations and practice exercises. The instructors also accompanied the students in field trips throughout the community, illustrating how the video production process worked and practicing the use of the video camera.

After the training, the local volunteers set out to produce videos without the instructors, picking up new skills on their own and developing their video production technique. The impetus to acquire new knowledge, seeded by the experience with the instructors, prompted the local volunteers to experiment and to create their first independent production, showcasing the work of the rural workers' cooperative [42].

As the volunteers produced more new videos, the content evolved from meandering explorations about a wide variety of topics to become increasingly focused on topics of relevance to the community. This evolution of the volunteers' reporting skills confirmed the findings expressed by Ferreira and Dudziak [36] regarding the process of information appropriation (the three-step process of digital, information, and social inclusion described earlier in this paper). It was also evident that the decrease of uncertainty was inversely related to the increase in learning, as individuals incorporated new knowledge to pre-existent cognitive structures, in the process of accommodation and assimilation described by Piaget [29]. The experience re-affirmed how people search for meaning in their learning process, seeking the "sense-making" described by Dervin and Nilan [1].

The community of Tombadouro engaged in an active period of video production for the ensuing 22 months. After publishing the video blog about the Rural Workers Cooperative [42], the community reporters produced a series of videos about the traditional cultural and religious events of the region, among them "The New Cross of Tombadouro" and "The Coronation of Our Lady, Mother of Jesus." The local public school, a major landmark, was the subject of several reports: "Ten Years of the

School of Tombadouro,” “Dance Festival at the School,” and “Adult Learning in Tombadouro.”

The community later expanded their coverage with a series of environmental reports which included, “Trash we Throw in the Trash Can,” “The Tombadouro Waterfall,” “Ecological Walk in Tombadouro,” “Seed Planting in Tombadouro,” and “Nature Preservation.”

Awareness of local cultural and musical traditions was reported in: “The Music Band of Tombadouro,” the traditional dance party “Forró Tomba,” “The Children’s Choir,” and the “The Knowledge Masters,” a report that detailed how to prepare local culinary delicacies, which provided a de facto inter-generational transfer of knowledge.

5. COMMUNITY EMPOWERMENT

Once they became aware of the potential presented by video reporting, the video bloggers of Tombadouro began to document certain topics with the goal of mobilizing the community to action. One such example was a video blog titled “Trash We Throw in the Trash Can,” meant to build awareness of the proper way to dispose of waste products and to demand that local authorities act to improve the community’s quality of life. The report framed trash disposal as a civil rights matter.

Another video blog that shows evidence of the use of video blogging to drive community empowerment is titled the “Problems with Orange Plantations in Tombadouro” [41]. The video reported on an infestation that was damaging local orange plantations. A user of the Gems of the Earth portal saw the video post online and brought it to the attention of a relative at the Brazilian Ministry of Agriculture, who in turn shared the video with a leading citrus researcher at the Brazilian Agriculture Research Agency EMBRAPA. Based on the video report, the EMBRAPA researcher was able to identify that the infestation was being caused by the South American cucurbit fruit fly and e-mailed the video bloggers suggestions on affordable control techniques. The video bloggers shared the suggested remedy with local orange producers, and those who followed the instructions were able to eradicate the pest.

Faced with the issue of infestation, orange producers in a remote mountain community would traditionally lack access to the technical knowledge required to address the problem. This anecdotal case illustrates how video blogs can positively impact the life of a rural community given the ability to access information and communication technologies. In this instance, access to video blogs and Web connectivity bridged the barriers of time and distance and enabled local growers to prevent crop loss and to realize income from a once-threatened harvest. The community was ultimately empowered financially and socially as a result of access to video blog production and publishing capabilities.

The World Bank Report on Empowerment and Poverty Reduction [30] defined empowerment as “the expansion of assets and capabilities of poor people to participate in, negotiate with, influence, control, and hold accountable institutions that affect their life.” The video blogs presented in this study are a clear example of community empowerment through the use of modern ICTs located in the Tombadouro telecenter. Local citizen reporters addressed an issue of interest to the community in a way

that secured them access to governmental institutions and resources that would otherwise be beyond their immediate reach. The telecenter empowered the community, gained them access to the knowledge required to solve local problems, and enabled them to partake through digital communication in the access that all citizens should have to the institutions that serve them.

According to the educator Paulo Freire [10], to participate is to discuss, to have a voice. The video blogging activity in Tombadouro made individuals aware that they could voice their concerns on the Internet to an audience beyond that of their immediate geographical surroundings. This awareness drove up participation in community video blogging practices. The Tombadouro telecenter became a public sphere, empowering the people and bringing about social change in the community.

Still, it is important to note that when telecenter activities focus primarily in the development of technical skills and capacity-building aimed at creating a work force destined to join the industrial job market, the telecenter may fail to contribute to the improvement of the quality of life of the community [2]. It seems that initiatives that fail to consider the needs and values of the community cannot promote human development regardless of the access provided to ICTs. Rural initiatives that provide training focused on the skill set required for the industrial job market equate individual success to leaving one’s own home and traditional practices. The video blogs produced in Tombadouro signal an alternative way to foster human development through digital inclusion, in a transformative manner that empowers rural communities and the individuals who reside in them.

6. YOUTH EMPOWERMENT

The volunteers who participated in the Gems of the Earth Video Blogging Project ranged from 16 to 22 years of age. They all invested freely their time to learn and to practice with the digital tools. In the video blog “The Talent of Leonardo Patrick,” the video blogger interviews a young child in the community of Tombadouro with a special talent for drawing. The video blogger studies education at the local telecenter, through the distance learning program offered by the Brazilian Open University. A student of Paulo Freire’s [9], [10], theory of education, this volunteer generated creative and insightful reports from Tombadouro. Her video blog interviews with members of the community recreated Freire’s dialogism in a rural setting. They exemplified the use of ICTs proposed by Gomes [15], who addresses the notion of the emancipation of education at a global level. Her reports provided an indication of the ways in which the telecenter and the video blogging project can contribute to youth empowerment in Tombadouro.

7. RESULTS

Community members posted a total of 95 videos in the Gems da Terra portal between September 2006 and May 2008 (see Table 2). This represents an increase of 53% over the amount of written blog posts published during the same 22-month period. Out of a total 62 written blogs posted during this time, only 38 were produced by members of the community. The other 24 were posted by project volunteers and global users of the Web portal. Considering only the posts from community members, the video blogs represented a 139% increase in participation on the portal.

In Conselheiro Mata, youth volunteers produced and posted 12 videos with an average length of 282 seconds (see Table 1). Two of the telecenter volunteers showed great skill in video blog production, yet they soon moved away from the village to attend school and to work in the city. The telecenter's video camera needed repair and the telecenter itself was shut down due to lack of community support when the owner of the building where the telecenter was located decided to re-purpose it. As a result, the video blogging experience in Conselheiro Mata was short-lived. The community is currently re-organizing and has vowed to re-open the telecenter.

In Rodeador [33], the instructors trained four volunteers and produced 11 videos with an average length of 148 seconds (see Table 1). The computers at the Rodeador telecenter ran the Microsoft Windows NT Operating System and the Microsoft Movie Maker freeware. In this community, the video blog project did not get past the training stage due to technical problems with the video camera, which has yet to be replaced.

In Milho Verde [24], the two instructors attempted to train several uncommitted volunteers. They produced two videos which were not uploaded to the portal because the telecenter lacked Internet connectivity at the time. After the instructors left the village, the volunteers were never able to proceed beyond the training they had received and the community produced no additional video blogs. The telecenter in Milho Verde has been beset by lack of leadership and commitment on the part of the community.

In São Gonçalo do Rio das Pedras [37], the instructors successfully trained two volunteers in the community telecenter. Overall, 22 video blogs were produced with an average length of 193 seconds (see Table 1). The volunteers created video blogs after the departure of the instructors, but the community eventually ran into technical problems with the video camera. After several attempts to repair the camera, the community purchased a new camera and resumed the production of video blogs. The community published 23% of all video postings on the Gemas da Terra portal.

The community of Tombadouro [40] produced the most video blogs (48) with an average length of 216 seconds (see Table 1). These constitute almost half of all videos published on the network portal. The youth volunteers were receptive to the digital tools and the entire community participated in the video blogging project, granting interviews. As of this writing, the community had experienced technical problems with the video camera, which requires replacement.

The data from Tombadouro provide an indication of change in adoption of the new technology. This community posted almost three times the number of video blogs as compared to written blogs. It is also noted that the subject matters of the video blogs were much more varied than that of the written blog posts, which were limited to event announcements and telecenter development issues.

Table 1. Topics of videos posted by the communities.

| Topics | Conselheiro Mata | Rodeador | S. Gonçalo do Rio das Pedras | Tombadouro |
|-----------------------|------------------|----------|------------------------------|------------|
| Agriculture | | | | 7 |
| Artistic Expression | 1 | 1 | 6 | 8 |
| Children | | | | 7 |
| Community | 6 | 7 | 2 | 4 |
| Community Members | | | 2 | 7 |
| Education | 2 | 1 | 4 | 9 |
| Entertainment | 1 | | 3 | 4 |
| Environment | | 1 | 3 | 4 |
| Food | | 1 | | 4 |
| Healthcare | 1 | | 1 | |
| Human Interests | | | | 1 |
| Local Culture | 3 | 1 | 3 | 1 |
| Local Holidays | | | 4 | 7 |
| National Holidays | | | | 1 |
| Outside guests | | | | 1 |
| Particular industries | | 1 | 2 | 2 |
| Public opinion | 2 | | | |
| Public Opinion | | 1 | | |
| Race | | | | 1 |
| Religion | | | 3 | 4 |
| Social Program | | | 1 | 0 |
| Sports | | | | 2 |
| Students | 2 | 1 | 2 | 6 |
| Technology | 1 | 1 | 1 | 1 |
| Telecenter | 4 | 5 | 2 | 6 |

Table 2. Video and written blogs posted in the network portal

| Community | Videos Posted | Blogs Posted | % Change |
|------------------|---------------|--------------|----------|
| Conselheiro Mata | 12 | 1 | 1100 |
| Milho Verde | 2 | 5 | -150 |
| Rodeador | 11 | 7 | -57 |
| S. Gonçalo | 22 | 10 | 120 |
| Tombadouro | 44 | 15 | 193 |
| Collaborative | 4 | 24 | -500 |
| Totals | 95 | 62 | 53 |

Evidence of the increase in participation by community members in the telecenter is shown by the traffic to the network portal, which almost doubled in the months following the introduction of video blogs [12]. While total visits to the site in September 2006 was 22,756, visits increased to 46,917 in October 2006 and 40,363 in November 2006. Given that during this period the volunteers were still learning how to use the video blogging tools and there was little awareness about the project beyond the communities, it is likely that the increase in visits to the network portal was due to increased participation by the villagers at the local telecenters.

Table 3. Primary and secondary topics of all video blogs posted in the network portal

| Topic | Primary | Secondary | Totals |
|------------------------|---------|-----------|--------|
| Community | 18 | 3 | 21 |
| Telecenter | 5 | 14 | 19 |
| Education | 13 | 3 | 16 |
| Artistic expression | 6 | 10 | 16 |
| Local holidays | 4 | 7 | 11 |
| Students | 0 | 11 | 11 |
| Community members | 0 | 9 | 9 |
| Environment | 7 | 1 | 8 |
| Local culture | 5 | 3 | 8 |
| Entertainment | 4 | 4 | 8 |
| Religion | 7 | 0 | 7 |
| Agriculture | 5 | 2 | 7 |
| Children | 3 | 4 | 7 |
| Particular industries | 4 | 1 | 5 |
| Food | 2 | 3 | 5 |
| Public opinion | 2 | 2 | 4 |
| Technology | 1 | 3 | 4 |
| Sports | 2 | 0 | 2 |
| National holidays | 1 | 0 | 1 |
| Outside guests | 1 | 0 | 1 |
| President | 1 | 0 | 1 |
| Race as an issue | 0 | 1 | 1 |
| Social programs | 0 | 1 | 1 |
| Human interest stories | 0 | 1 | 1 |
| Totals | 91 | 83 | 174 |

Table 4. Gender diversity of primary and secondary actors and reporters

| | Female | Male | Mixed (both female and male) |
|-----------------------------|--------|------|------------------------------|
| Primary or secondary actors | 67 | 41 | 35 |
| Gender of reporter | 42 | 15 | 28 |

Community, whether as an expression of place, a gathering of individuals or as a reason for a common activity, was the most frequent topic of the video blogs, surpassing video blogs that reported on the telecenter(s) (see Table 1). The video blogs also featured topics revolving around education (whether in school activities or in less formal settings) and artistic expression, the latter often in the form of displays of the arts and crafts of the region and the talents of local artisans. The overall content privileged local community events and activities, topics that do not receive wide coverage in broadcast television, whose programming closely mirrors the dominant culture of major urban centers São Paulo and Rio de Janeiro [39].

The video blogs represented the diversity that exists in the communities. In a majority of the video blogs, the primary or secondary actors were female (see Table 4). Male actors were less prevalent. Roughly one-third of the videos showed both females and males as first or second actors. The actors were almost always visible in the shot, and more often than not their voices were heard. The majority of the video blogs were produced by women working alone as reporters or as partners with a male reporter. As Table 5 indicates, the primary or secondary actors featured in the video blogs represented a diversity of ethnicities.

Table 5. Ethnic diversity of primary and secondary actors

| Primary or secondary actors | |
|-----------------------------|----|
| White | 35 |
| Light brown | 28 |
| Dark brown | 27 |
| Black | 10 |
| Mixed group | 40 |
| Unclear | 12 |

8. CONCLUSIONS

This study found evidence that video blogging tools empowered the community as a whole, and young video reporters in particular. The results remind us of the importance of Papert's [28] affirmation that equal access to computers and the Internet require an epistemological pluralism and the acceptance of multiple forms of knowledge and thinking [31]. This study concludes with an analysis of the overall impact of Web 2.0 technologies for social and economic development, and identifies the strengths and shortcomings derived from the application of these digital tools.

The Gems of the Earth Video Blog project set out to empower rural telecenter users in the community with video editing and publishing capabilities. One of the most noticeable impacts of the project is the villagers' increased awareness of the community telecenter. The video blogging tools at the telecenter engage everyone in the community, regardless of age or occupation. The few volunteers who were trained in the use of video blogs acquired a new higher status among their peers, and are now recognized for possessing the skills that can bring innovation to the community. The volunteers were all teenagers and young adults.

This study showed that the level of adoption of information and communication technologies increased considerably upon the introduction of video blogging capabilities, as compared to a

previous qualitative evaluation of the impact of the telecenters in the communities [20], [35]. The one instance of Tombadouro, where villagers took full ownership of the telecenter project, may signal a factor that can positively impact telecenter sustainability. The number of blog post views on the Gemas da Terra portal increased significantly, compared to the traffic to written posts [11], a possible indication that the introduction of video blogs drove up interest from global and community users of the portal.

It is possible to conclude that the citizen reporters in Tombadouro produced more video blogs than those in other communities because they had access to production equipment for a longer stretch of time and also because residents in that community shared a higher sense of solidarity and collaborated easily with each other.

It is also interesting to note that women were prolific content producers. The fact that the video content portrayed a diverse set of actors in terms of gender and ethnicity, seems to confirm Hoffmann-Riem's model [16] that links the diversity of reporters to an increased representation of diversity in content.

The increased adoption of the new video tools by the rural villagers, in comparison to written blog posts, and the wider range of topics addressed by the video blogs led the researchers to conclude that the video blogging project was received positively in the rural telecenters. The researchers attribute the increase in participation to the preference for face-to-face communication over written communication in communities with high rates of illiteracy.

Video provides an ideal mechanism for rural people to adopt modern ICTs and participate in the Information Society. This study contradicts the assumption that low bandwidth Internet connectivity and job skills training are sufficient to promote the digital inclusion of rural communities. Instead, this study shows that rural telecenters that provide video tools and ample bandwidth connection to the Internet may provide a swifter path to telecenter sustainability and to the digital inclusion of rural dwellers.

The technical snags that occurred with the digital video cameras used in this case study signal the need for technological improvement. The cameras deployed in this project used tapes, which required mechanical parts to operate and were more prone to disrepair. In a rural setting, the cameras are highly susceptible to dust, extreme weather conditions, and unstable electrical supplies (while being charged or when connected to computers). All of the cameras purchased for the project failed at some point. However, newer and more affordable all-digital solid state cameras that record good quality video have since been introduced to the market. The same is true for affordable video projectors that would allow video bloggers to share their reports with the community in a public space and drive up participation beyond the environment of a single computer screen.

Limited bandwidth capacity may also limit the adoption of video blogging in rural areas. Demand for bandwidth over the last mile is likely to increase as more communities adopt the use of video as the best means of communication among less educated users. More than 78% of the world's population has yet to participate in the Information Society [18]. Universal access to the Internet remains a global challenge, given the limited access to ICTs in most of the developing world. The success of many rural telecenter projects worldwide thus depends upon the roll-out of enhanced Internet tools and Web 2.0 technologies, the overall increase in bandwidth in the backbone and the periphery, and the continuous improvement of the

cost-performance ratio of hardware tools such as computers, video cameras and projectors.

9. FUTURE CONSIDERATIONS

The lessons learned from the video blogging project will influence the future training of Gems of the Earth rural telecenter managers and the network's strategy for attaining sustainability. It is clear that community engagement is the very first step required of every telecenter. Video blogs show the way to achieve community participation over the short run.

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