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Social Capital, Digital Inequality, and a “Glocal” Community Informatics Project in Tianzhu Tibetan Autonomous County, Gansu Province

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ABSTRACT

This article examines a “glocal” community informatics project that is transforming villages in Western China. Funded and initiated by the U.S.-based Evergreen Education Foundation (EEF)—an organization that makes public computing resources available to the digital poor and digital extremely poor communities—the project supports the establishment of public computing sites in primary and middle schools, thereby improving villagers’ digital consciousness and digital literacy. This study uses a digital inequality model—organized around a pyramid of five classes comprising the digital elite, the digital rich, the digital middle class, the digital poor, and the digital extremely poor—to assess the impact of this project. The authors found that, on the whole, the EEF’s training programs helped people move up the pyramid of digital inequality.

INTRODUCTION

Social inequality in China has increased dramatically in the past thirty years. According to the World Bank and National Bureau of Statistics of China (NBSC) data, the Gini Index for China increased from 0.317 in 1978 (Wang, 2009) to 0.403 in 1998 (International Bank for Reconstruction and Development/World Bank [IBRD/WB], 2001), 0.45 in 2001 (IBRD/WB, 2005), 0.469 in 2004 (IBRD/WB, 2007), 0.496 in 2006, and 0.61 in 2010 (Gao, 2012). Under the Gini Index (which measures the inequality among values of a frequency distribution, such as levels of income), optimal social equality is recorded at below 0.3; normal levels are found between 0.3 and 0.4; levels over 0.4 indicate that social inequality is widespread enough to be a concern; and anything at or above 0.6 is associated with a significant degree of social inequality. As figure 1 shows, the gap between rich and poor in China has been widening since the late

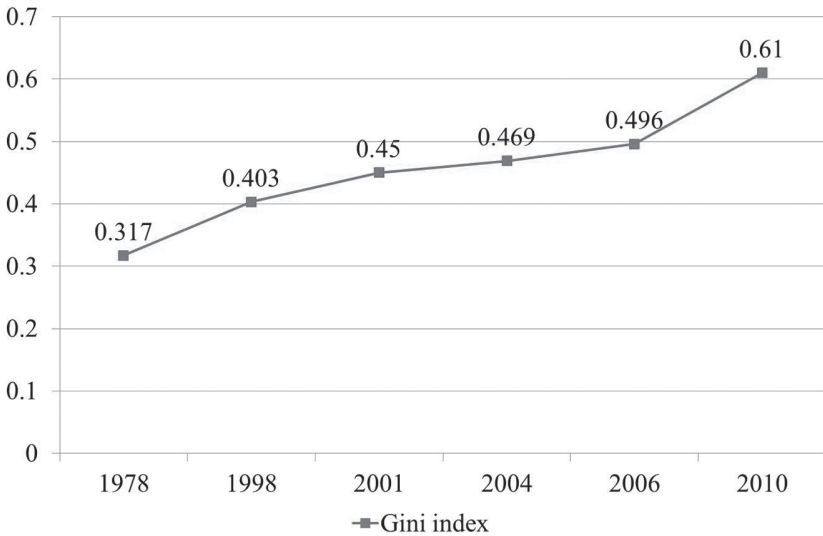


Figure 1. Gini Index Changes in China (1978–2010).

1970s. The gap in income between urban and rural areas has also been widening, with the income ratio (urban to rural) increasing from 2.79 in 2000 to 3.31 in 2008 (Fan, 2009). Given these trends, it is urgent that scholars pay attention to the relationship between ICT and social inequality and the digital inequality phenomenon.

Information and communication technologies (ICT) have been digitizing the planet and transforming it into a global village. People are now heavily involved in both local and long-distance social relationships, the combination of which is described by Wellman as “glocal” (Wellman, 2004). This essay investigates the way that the Evergreen Education Foundation’s (EEF) “glocal” community informatics project in Western China builds on, and strengthens, the social capital present in local communities and how it motivates villagers to overcome the digital inequalities they face.

LITERATURE REVIEW

Scholars developed the discourse of digital inequality out of the simple bipolar paradigm of the digital divide, which reflects social inequality as a whole. Digital inequality refers to the stratification of people with differential access to, and usage experiences of, ICT (Dimaggio, Hargittai, Celeste, & Shafer, 2004; Hargittai, 2003, 2008; Hargittai & Hinnant, 2008). Inequality in the digital era is caused by economic, political, cultural, and social inequality; unequal access to ICT; and divergent motivations, utilization ability, and usage influences (Hsieh, 2005; Ono & Zavodny, 2007;

van Dijk, 2005). Kvasny describes digital inequality as a digital reproduction of traditional social inequality (Kvasny, 2002, 2006; Mossberger, Tolbert, & Stansbury, 2003). With the rapid development of bottom-up information flows, we have seen the emergence of a class of information “have-lesses,” situated between the information “haves” and the information “have-nots” (Qiu, 2009). Class struggle and the information war (comprising conflicts over access to, and ownership of, information) are the main characteristics of digital inequality. ICTs are used by the ruling class to control society (Castells, 2001; Luke, 1997).

THE IMPORTANCE OF SOCIAL CAPITAL

One sociological concept important for understanding digital inequality is the idea of social capital (Yan, 2011). Social capital is the ability to obtain resources from relationships and social networks (Lin, 2001; Williams, Han, Yan, & Alkalimat, 2012). It has also been defined as “connections among individuals-social networks and the norms of reciprocity and trustworthiness that arise from them” (Putnam, 2000, p. 19). Marginalized individuals and organizations usually have a deficit of social capital (Kvasny, 2002), and ICTs can often positively influence their access to it.

Scholars have identified two kinds of social capital to help explain the ways in which a person’s networks can shape their life chances: *bonding* social capital and *bridging* social capital:

Some forms of social capital (bonding) are, by choice or necessity, inward-looking and tend to reinforce exclusive identities and homogeneous groups. . . . Other social networks (bridging) are outward looking and encompass people across diverse social cleavages (Putnam, 2000, p. 22).

These terms are important and take on special resonance in the context of community informatics. In communities where community technology centers (CTCs) are embedded, *bonding* social capital is important insofar as it helps integrate community informatics programs into the life of the community. *Bridging* social capital, meanwhile, helps local CTCs acquire temporary resources and external resources—resources that it then makes available to its constituency. Likewise, bonding social capital and strong ties have the potential to promote ICT use in communities (Williams, 2005); they promote word-of-mouth recommendations, which constitute the main way that CTCs attract new users (Kvasny, 2002).

Informal information exchange among peers can also help individuals improve their knowledge of digital media (Hargittai, 2008). Peer relationships help shape teenagers’ online behavior, for instance, in two ways: 1) by offering a built-in network of technical support that young people can deploy when they encounter technological difficulties; and 2) by offering models for digital behaviors (Stroope, 2008). The expectations of

an individual's family, relatives, friends, and peers is also critical in shaping a digital “subjective norm”—that is, the “perceived expectation from referent others for an individual to perform the behavior of interest” (Hsieh, 2005, p. 111).

Scholars have identified three ways that strong ties motivate individuals to get connected to the Internet and enhance their digital competence: 1) by accessing “technical assistance from persons employed to provide it (workplace support staff, customer support staff, librarians, and teachers”); 2) by getting “technical assistance from friends and family members”; and 3) through “emotional reinforcement from friends and family in the form of commiseration when things go wrong and positive interest when things go right” (Hargittai, 2008, p. 940).

Williams and Durrance (2008) reviewed studies from Liff and Steward (2001a; 2001b), Borgida et al. (2002), Kvasny and Keil (2002), and Williams (2005), and concluded that existing social capital influences local communities' use of information technologies. In particular, robust social capital assists in the launching of technology projects, keeping them sustainable and ensuring their success. In Toledo, Ohio, for instance, the Murchison Center successfully generated both bonding and bridging social capital in and outside of urban poor communities by deepening local “cyberpower” on three levels—individual, social, and ideological. In turn, these levels of cyberpower fed back into the organization and the community, promoting the broader goals of democracy and social inclusion. (Alkalimat & Williams, 2001).

Another group of scholars have found that social capital can determine the speed at which a person learns digital skills. Hargittai notes that “People who are able to draw on their social contacts for information on how to use the medium will learn more quickly and will be exposed to a broader repertoire of online services than those who have few people to whom they can turn for advice with their Web use” (2003, p. 12). Likewise, people who are part of a large and dense social network maintained by a combination of face-to-face, telephone, and written communication find it easier to expand their social network through Internet access and usage than those in a smaller network. Van Dijk calls this the “Matthew Effect” (2005).¹

Scholars producing research on relationships between social capital, community informatics, and digital inequality have asked a range of important questions. Can social capital benefit local community informatics programs, and propel people to traverse the digital divide? Which form of social capital—bonding or bridging, “strong ties” or “weak ties”—is most effective in helping overcome the digital divide? We need more in-depth explorations of diverse communities around the world to discover the patterns in how social capital works and what kinds of ties will be most useful in narrowing the digital divide.

RESEARCH DESIGN

Research Questions

This study was designed to address the following questions:

- How has the “glocal” community informatics program, funded by EEF, helped rural residents overcome digital inequality and move up in the digital pyramid?
- How did EEF’s computer donation and training program serve as a form of bridging social capital? How did it activate and strengthen the kinds of bonding social capital that already existed within the communities?

In our efforts to address these questions, we use the concept of cyberpower—which we also call “digital solidarity.” In this study, *cyberpower* means the ways in which community members use ICT to meet their economic, political, and cultural needs; defend their own interests; and affect policy-making processes. We also use a hybrid model of digital social stratification—one that combines traditional social stratification theories, communitarianism, and civil society (Yan, 2012). We refer throughout to the five layers of digital society: the digital extremely poor, the digital poor, the digital middle class, the digital rich, and the digital elite. Figure 2 explains how IT access and usage, information access and usage, digital literacy, and cyberpower place people in seven digital classes.

The boundary between the digital poor and the digital middle class is determined by whether or not community members have access to ICT devices. If he/she has access to, and uses, ICT, and creates and makes content that is open to the public, he/she can be defined as being digitally rich. Those who are part of a digitally cohesive community are regarded as the digital elite. Poor individuals can generally be classified into four groups: the material-poor, the digitally illiterate, the materially and digitally illiterate, and finally the digitally extremely poor. The group we call “digital illiterates” includes a special subgroup of individuals who, although they have some ICT skills, have little to no interest in ICT.

METHODS

This study collected data from in-depth interviews, focus groups, questionnaires, and EEF training documents. We studied EEF’s work in five villages: Chakouyi 岔口驿, Hongda Village 红大村, Shimen Village 石门村, Datang Village 大塘村, and Kela Village 科拉村 in Tianzhu County, Gansu Province.

We focused on villagers as our unit of analysis. In January 2012, we conducted forty-nine in-depth interviews. In each interview we asked thirty questions. After the interviews, we assigned each interviewee an independent identifier, a number from 1 to 49. (For more information about these interviews, see Appendix A.) We also conducted five focus groups, wherein we asked forty-two questions. These focus groups took place in

Digital Classes	ICT Access & Usage			Information Access & Usage			Digital Literacy	Cyberpower
	Uncon- sciousness	Access	Usage	Access	Usage	Creation		
Digital Elite	+	+	+	+	+	+	+	+
The Digital Rich	+	+	+	+	+	+	+	-
Digital Middle Class	+	+	+	+	+/-	-	+	-
Material Poverty	+	-	-	-	-	-	+	-
Digital-Illiterate	-	+	-	-	-	-	-	-
Dual poverty	+	-	-	-	-	-	-	-
The Digital Extremely Poor	-	-	-	-	-	-	-	-

Figure 2. Digital Social Stratification Model.

the villages and in Tianzhu No. 1 High School, a school that serves as the local agency-in-charge of the EFF work. The high school plans EFF's computer training sessions, selects core volunteers to serve as computer teachers, and develops local training sites. Fifty-four villagers participated in these groups. In total, 132 villagers were interviewed or surveyed in our study.

Interviews, questionnaires, and focus groups covered several topics. We asked about ICT access and ownership; usage of computers, mobile phones, and the Internet; awareness, experiences, expectations, and evaluations of the EFF computer-training projects; information sources, access, usage, and creation; demographics and life and career experiences of the villagers; villagers' future expectations; and villagers' social, economic, political, and cultural capital (see Appendix B and Appendix C).

Our analysis consisted of reading through 137 pages of transcripts and identifying 672 distinct, meaningful chunks of narrative. We analyzed and coded these sections manually. Additionally, the questionnaires were input into a SPSS data set containing ninety fields. We also examined archival documents at the Kala Primary School training site. Throughout our study, we used a content analysis method and descriptive statistics.

Table 1 gives the demographic information of the eighty-four villagers who submitted questionnaires. Of the forty-eight in-depth interviewees, thirteen (27.08 percent) were female, thirty-five (72.92 percent) were male.

THE EFF'S "GLOCAL" COMMUNITY INFORMATICS PROGRAM

EFF'S Community Informatics Program in Tianzhu County

Tianzhu County 天祝县 was the first ethnic autonomous county designated by Chou En-Lai, the first Prime Minister of the People's Republic of China. Most of the county's residents are Tibetans, so its official name is Tianzhu Tibetan Autonomous County 天祝藏族自治县. There are 172 administrative villages and 17 urban community residents' committees in the county, most of which are located in the mountains at high altitudes of between 2040 and 4847 meters. According to official statistics, there were 53,871 households and 212,957 registered citizens in the county at the end of 2005. Most people in this county work in agriculture, animal husbandry (white yak, goats), and the extraction of mineral resources. In other words, this area is still on the edge of transforming from an agricultural society to an industrial one. It has barely entered the informational age.

As is the case elsewhere in China, most informatization projects in Tianzhu are top-down. Using major search engines, one can easily find policy documents on ICT plans or strategies relating to education, government, state-owned sectors, population and birth control, medical insurance, public security, archives, and tourism. These policies and plans aim to tackle a range of topics—including information technology and telecommunication markets; informatization in the public and private

Table 1. Demographics of the Eighty-Four Questionnaires

Average age 41 years old	Frequency	Percent (N = 84)
Gender		
Male	63	75.00%
Female	17	20.20%
Missing	4	4.80%
Ethnicity		
Han	64	76.20%
Minorities	16	19.00%
Missing	4	4.80%
Education		
Primary school	32	38.10%
Middle school	36	42.90%
High school	9	10.70%
Junior college	3	3.60%
B.S., M.S., Ph.D.	2	2.40%
Missing	2	2.40%
Family income (per year)		
≤4,000 RMB	19	22.60%
4,001–6,000 RMB	18	21.40%
6,001–8,000 RMB	14	16.70%
8,001–10,000 RMB	15	17.90%
10,001–12,000 RMB	9	10.70%
≥12,001 RMB	9	10.70%
Professions		
Farmers	65	77.40%
Owners of private companies	1	1.20%
Doctors	1	1.20%
Aquaculture producers	2	2.40%
Laid-off workers	1	1.20%
Migrant workers	3	3.60%
Government employees	3	3.60%
Students	1	1.20%
Missing	7	8.40%

economic sectors; the building of commercial infrastructure by state-owned telecommunication corporations; emerging technologies; commercial broadband; optical cable; and new forms of networks. Although some documents propose that ICT in rural Tianzhu should form an essential part of the government’s so-called “social harmony and equal information society” of the future—and thus, that the digital divide should be narrowed—the state has not developed any specific plans for bringing computers and Internet services to villages.

Internet access rates have grown steadily in China over the past several years. By the end of June 2012, the number of Chinese “netizens” reached 537.6 million—or 39.9 percent of the population. Mobile “netizens” constitute 72.2 percent of this total (388.25 million people). Additionally, 90.3 percent—more than 485.45 million—own computers of their own, and have access to the Internet at home. This group makes up 36.03 percent of China’s population. Offices, cybercafés, schools, and other public spaces are ranked as the top four public computing sites for Chinese “ne-

tizens.” Digitally connected Chinese citizens report using the network for a range of activities: 82.8 percent use instant messaging; 79.7 percent use search engines; 76.4 percent listen to music online; 73 percent get news online; 65.7 percent read blogs; 65.1 percent watch videos online; 61.6 percent play online games; and 50.9 percent use wiki blogs (China Internet Network Information Center [CNNIC], July, 2012). Thus it seems that more than half of China’s online population is part of the “digital rich” class, on its way to becoming part of the digital elite.

But when we consider computer access, ownership, and Internet penetration rate in rural villages, we find quite a different situation. Our study found a computer penetration rate of 15.91 percent. This lags behind the average for China as a whole (36.03 percent). Even then, our study focused on digitalized villagers; thus our findings probably reflect a higher penetration rate than the real rate in most Chinese villages. Indeed, even for the county we studied, the actual is probably lower than our findings would suggest. Table 2 provides a general description of ownership of computers at home.

Although mobile “netizens” make up a dominant part (72.7 percent) of all “netizens” in China, only a relative small proportion (14.39 percent in total, 19 of 132; see table 3) of the villagers we interviewed use mobile phones to access the Internet. Most of our interviewees cannot type words on cell phones because they lack basic literacy skills (Williams et al., 2012).

Ten of the forty-eight interviewees reported that they have access to the Internet by way of both computers and cell phones; nine report that they have no computer at home. One migrant worker—who works in an Inner-Mongolian coal mine and who was invited to be an interviewee when returned home during the winter holiday—reported that he uses QQ software on his mobile phone to contact friends and relatives. Unfortunately, he had not heard about EEF’s local computer training course and had just bought a new desktop computer prior to our arrival. He relies heavily on the mobile network because he does not yet know how to use a computer.

Table 2. Do You Have a Computer at Home?

	Frequency	Percent (N = 132)
Yes	21	15.91%
No	111	84.09%

Table 3. Do/Did You (Ever) Surf the Internet via Cell Phone?

Answer	Number of Interviewees	Percent (N = 132)
Yes	19	14.39%
No	109	82.58%
No answer	4	3.03%

How the Global EEF Created Local CI Practice in Tianzhu County, Gansu

The EEF is a nonprofit organization founded in 2001 by Dr. Faith Chao 赵耀渝 and a group of Chinese and American professionals and academics. The foundation aims to create more educational opportunities for middle and high school students in rural China by building libraries and funding scholarships for promising but financially vulnerable students.

EEF has recently expanded its programs to include a specialized community informatics program called Information Technology Training for Rural Communities. The program, which began in May 2009 and lasted for three years, supported a collaboration between Evergreen Central Library of Tianzhu No. 1 High School and six local rural middle and primary schools. Together they introduced information technology to villagers and provided them with computer training. In these trainings sessions, participants learned how to boot up, operate, and maintain a personal computer; how to surf the Internet; and how to search for information—about agricultural technologies, marketing, regulations, and health care—online.

HOW EEF RUNS ITS LOCAL COMMUNITY INFORMATICS PROGRAM

EEF employed four groups of volunteers for the IT training program. The first consisted of computer teachers at Tianzhu No. 1 High School. This group served as seed trainers for computer teachers in six primary and middle schools in four agricultural areas. The idea was that each of the teachers this seed group trained would turn around and pass along their knowledge to residents in their communities. The second group consisted of computer-savvy villagers. This group also served as seed trainers. They provided one-on-one training for digitally poor villagers. The third group consisted of a team of volunteers from the Department of Information Management at Lanzhou University in Gansu Province. This group helps to manage the Evergreen Online Forum, which serves as a virtual community where “students”—that is, villagers enrolled in the computer-training sessions—can communicate with each other. The final group consisted of library professionals from Shanxi. They designed an assessment scheme for the training project.

EEF donated desktop computers, laptops, and projectors to the school training sites and organized the volunteers and staff into three working groups: 1) a training group; 2) an assessment group; and 3) an online forum group. They created a special self-help training model designed to leverage the financial, educational, and human resources embedded in this project—the *bridging* social capital that EEF offered and the local *bonding* social capital present in the county education system. There are many examples of how this worked. A local high school lent its technological resources to its feeder middle schools and primary schools. Mean-

while, middle and primary schools served as local IT training sites, training their students' parents at the grassroots level. Local schools improved their own education quality and sustained rural compulsory education by informing, educating, and giving back to the local taxpayers.

Although mainland China still struggles to develop its civil society, community informatics projects such as EEF's IT training program are helping to transform Chinese rural communities into informational villages in a bottom-up way. Locals can reach long-distance social nodes outside their communities through EEF's training program. They can also access public computer labs for free in EEF-funded primary and middle schools. Still, villagers stay physically rooted to fixed personal computers and Internet connections at home, at school, in the village committee's office, and in other local public places. We think that Barry Wellman's term, "glocal," does a good job of describing the connections that make this work successful.

HOW THE EEF'S "GLOCAL" PROGRAM HELPED LOCALS OVERCOME DIGITAL INEQUALITY

We measured the impact of EEF's "glocal" computer training program on digital inequality in several different ways. We measured how interested in, and supportive of, the program the locals were. We also asked villagers to recall the details of how they got information about the EEF program and to tell us stories about their learning experience in the computer training program. Additionally, we asked about the social relations embedded in the process. Finally, we measured the effects of EEF's program on interviewees' access to, and usage of, information technologies, as well as on their chances of climbing the digital pyramid.

How Did Locals Learn about the "Glocal" Program?

Residents of the five villages showed a high rate of awareness of, and support for, EEF's computer training program, as shown in table 4. Nearly two-thirds of the interviewees and four-fifths of questionnaire-submitters had heard of the EEF and its computer training sessions. More than 30 percent of respondents enrolled in these sessions. There they studied basic procedures of booting up and powering off computers, as well as methods for surfing the Internet, downloading information, and obtaining a QQ account. They learned to search for information about agricultural technologies, market prices of agricultural products, the cultivation of Hongti grape and Chinese medicinal materials, and diseases and insect pest control; and they learned how to register for, read, and publish articles on the Evergreen Online Forum. Of the villagers sampled, 82.58 percent expressed interest in EEF's ICT training programs.

EEF's computer training program empowers local residents to use ICTs to change their lives and work. EEF trains villagers to be digitally conscious—

that is, to access and use ICT and to search information in which they are interested. One elderly interviewee recognized that knowing how to use a computer could change the material conditions of farmers’ lives, especially with regard to Hongti grape cultivation. When asked *How does EEF’s computer training session affect your family and you?* this villager replied:

Oh, the change is so dramatic that you cannot imagine. Before the training, I thought computers were only for gaming and time-wasting activities. Sometimes my son and grandson would go to a cybercafé. But during the training session, my son and I were taught to search for information on grape-cultivating technologies. After that, we found that computers could promote our businesses. . . . Computer training is enriching some traditional poor villagers. . . . We were the first trainees in the program, and my son bought a desktop computer soon after the training session.

When asked, *Did you gain benefits directly from the training?*, the same respondent replied:

So many benefits so far. Nowadays we live in an “information society”—a phrase I learned from a TV program. We farmers cannot understand anything without information and computers. Indeed, without good information, we can’t harvest good agricultural products. For instance, baby cabbages—the market tends to prefer the smaller, thinner ones over the big, fat ones. Farmers always thought that larger was better! If you don’t have this kind of market information, you will lose money. . . . Another example is that when our greenhouse grapes suffered terrible diseases, I asked my grandson to search for information

Table 4.1. Do You Know About the EEF Computer Training Program?

Answer	N	Percent (N = 132)
Know about the EEF	99	75.00%
Don’t know about the EEF	31	23.49%
No Answer	2	1.51%

Table 4.2. Did You Take Part in the EEF Computer Training Program?

Answer	N	Percent (N = 132)
Yes	42	31.82%
No	88	66.67%
No answer	2	1.51%

Table 4.3. Will You Take Part in the EEF Computer Training Project Again or for the First Time?

Answer	N	Percent (N = 132)
Will	109	82.58%
Will not	9	6.82%
No answer	14	10.6%

on how to control the diseases and help the plants recover. He found a remedy through a search engine and in the end, it all worked out.

EEF's computer training courses offered a large proportion (72.2 percent, thirteen of eighteen) of the interviewees their first experiences using computers. New opportunities to use computers and the Internet are important bridges that have the power to help the digital material poor climb the digital pyramid. Mr. Wang, a teacher at Huazangsi Middle School, described an EEF training session: "We have eighty computers in our lab. We successfully trained more than thirty villagers during the last winter holiday. Everyone who participated got a hands-on, one-on-one instructional session." Instead of seeking access to public computers, some wealthier trainees chose to equip their own homes with desktop computers once they became digital literate. The clinic doctor in Kela Village and the elderly interviewee in Chakouyi were two such individuals.

Tianzhu County's primary, middle, and high schools have benefitted from EEF's training program through the acquisition of modern computers and projectors. These schools allocate separate spaces for such ICT devices. Computer teachers maintain them. As can be seen in table 5, these computer labs have become the most popular public computing site for villagers. The labs help young residents by serving as bridges between their often digitally poor families and their computer-literate teachers.

Differential access to computers and the Internet impacts the degree of autonomous usage. Generally people always feel most comfortable and free when surfing the Internet at their own home, even if they are not confident about using computers. When they use computers in public spaces like school labs, offices, or relatives' or friends' homes, their emotions and behaviors are likely to be restricted. One of the interviewees, a seed trainer trained in the first session, expressed strong uncertainty, lack of confidence, and fear about using the public computer in the EEF training course at Tianzhu No. 1 High School:

At first when I was in the EEF's computer training classroom and sitting in front of the desktop computer (the likes of which I had never touched before), I could do nothing but stare at it. I worried that I would break the computer if I touched it without any guidance. Mr. Lei, the computer teacher, told me that it was harder to break a computer than to break a human brain, and that I should feel free to manipulate it.

Some of the most visited public computing sites, cybercafés bear the weight of children's and young adults' expectations concerning their lives and careers. There's no cybercafé in the five villages studied, but there are a few in the town of Huazangsi 华藏寺 and in the urban areas of Tianzhu County. Eleven of the forty-eight interviewees (22.92 percent) noted

Table 5. Where Do/Did You Use Computers?

Computing Sites	Number of Responses	Percent (N = 53)
Primary/middle school	33	62.26%
Village committee office	5	9.43%
Cyber café	5	9.43%
Home	2	3.77%
Relatives' house	2	3.77%
Village clinics	2	3.77%
Employers' office	2	3.77%
Friend's store	1	1.89%
Others	1	1.89%

their belief that computers and the Internet exert a negative influence on children and young adults. “Computers,” they said “are time-consuming for students” and take time away from “reading textbooks,” “getting high scores on examinations,” and “getting admitted to famous universities after graduation from high school.” For younger villagers at bottom of the digital pyramid, the cybercafé offers a way to escape from the terrific pressures of both poverty and the exam-oriented education system. A young interviewee, who was completing an unsatisfying internship assigned by his vocational technical school, evaluated the cybercafé as follows:

I mean, who goes to a cybercafé to use office software like Microsoft Excel? No, we go to the cybercafé to do improper or unimportant things—like playing online games, watching movies, or chatting with friends via QQ. . . . Cybercafe computers perform better than the others we have access to. I usually check in and spend my time there surfing the Internet. I ignore the terribly polluted air and crowded space.

Computer training does not simply alleviate rural poverty by means of digital tools, digital consciousness, and digital literacy. It also offers villagers the opportunity to strengthen their social ties through social networking sites (SNS) and to create and share knowledge online. One rural businessman who buys and sells Chinese traditional medicine emphasized the importance of keeping up with market information via computers:

My business is to purchase Chinese traditional medicinal materials from local farmers. I usually seek related market information on computers at my neighbor's home or at the Kela Primary School computer lab. I also keep in touch with my business partners by using my mobile phone to make calls and use QQ software. Now that I have completed an EEF-sponsored computer training, I can meet my business information needs by myself. I'm also planning to purchase a computer for my business. The information I get from the Internet helps me understand and predict medicinal materials' prices; this helps me to make decisions about when to buy medicinal material seeds. Once I lost 8,000 RMB because I lacked proper and sufficient information.

Bonding Social Capital Spreads EEF Computer Training Messages to Locals

After analyzing transcripts of our forty-eight in-depth interviews, we identified twenty-six chunks of narrative that offered important data about villagers' social capital. These chunks reveal the role of bonding social capital in spreading the word about the EEF trainings. As table 6 indicates, ten of the villagers found out about EEF's training program from teachers at local primary and middle schools. One might consider these networks *bonding* social capital. Students also function as social networking nodes, offering bridges between teachers and villagers. Village branches of the Communist Party of China (CPC) and village resident committees—most of which have high-performance computers in their offices—also increase the *bonding* social capital of rural communities. Eight interviewees had either received training notices from village committees (five cases), were invited by their relatives or colleagues who were employed as village officials, or made use of the training resources as a village leader.

For rural families in China, rich *bonding* social capital also builds reliable ladders for mobility up the digital pyramid. Of our interviewees, seven relied on *bonding* social capital embedded in their own families. Two female villagers and another man became familiar with EEF and its training program from their experiences as students in the computer-training course. The female villager always answered our questions or stated her opinions by protesting, "I don't know how to answer your questions. My husband knows more about using computers." The driver interviewed in Chakouyi heard information about EEF's training course from his neighbors.

EEF's "Glocal" CI Project Changed Locals' Information Behaviors

More detailed evidence of the three forms of empowerment for Tianzhu County's villages were classified in terms of information behaviors and states of mind; they are listed in table 7. At least two interviewees suggested that villagers attained improved typing skills, more knowledge about the basic operation of computers, more access to computers, information related to ICT purchasing decisions, and tips on how to search for agricultural information. These training programs also ramped up local cyberpower in the form of improved digital literacy and digital consciousness.

As table 7 shows, the project did have some failures. A female resident of Hongda Village said, "I could not learn the basic computer skills during

Table 6. How Did You Know of the EEF Computer Training Program?

Social Capital	N	Percent (N = 48)	Percent (N = 26)
Teachers in primary/middle school	10	20.83%	38.46%
Village officials	8	16.67%	30.77%
Parents/children/couple	7	14.58%	26.92%
Neighbors	1	2.08%	3.85%
No answer	22	45.83%	

Table 7. What Changes Did the EEF Computer Training Program Bring You?

Categories	Changes	Interviewee Identifier
<i>Positive Changes</i>		
Digital consciousness	I start to encourage myself to touch computers	2
	I feel my stronger love for computers	40
Digital literacy	I start to type by myself	3, 15, 20, 40, 41, 45
	I can start/reboot/power off computers	15, 22, 40, 45
	I can use search engines	20, 41
	I know how to search for information on grape diseases	2, 15
	I know how to search for information on Chinese medicine prices	49
	I can download MP3s, movies, or other online documents	13
Digital Material rich	I start to use public computers or computers in other places	12, 28, 45, 46
	I/My family members bought a computer after the training	3, 9, 46
	I bought Internet access services for my computer after the training	40
Cyberpower	The computer can help me make more money from Chinese medicinal materials	49
	I can use another tool to keep in touch with my friends	25
<i>Negative Changes</i>		
Digital illiterate	I still cannot use the computer	23, 44
Digital unconsciousness	I still think computers are not good for children because of online gaming	16

the training. . . . And more importantly, I have no spare time to practice [the computer skills]. . . . I make decisions on agricultural issues just from my intuitional experiences.” Meanwhile, a male villager in Kela Village said:

My family earns our living by cultivating wheat and soybeans. I cannot afford a computer at home and never get access to the Internet via cell phone. . . . I remember that the computer teacher [in the EEF training program] taught us to video chat and surf the Internet, but not how to get around digitally on our own. I don’t think two training sessions were enough.

The former Village Party Branch Secretary of Hongda Village, who was also the local Hongti grape broker, expressed his dissatisfaction with computers in this way: “In 2009, the County CPC Organization Office held a computer training course for our village secretaries. Participants were taught how to turn on and power off computers, how to type words, and how to search for information.” Then he smiled bitterly, with a pained look. “It’s not useful at all,” he said. When asked, *Do you have a computer at home?* he replied:

No, my younger child is still in middle school. . . . Rural families nowadays are rich enough to afford computers; however, we worry about the negative effects of computers on children who are still in school. You know you cannot stop them from playing online games. Once they know how to play on the computer, they stay online all the time.

These comments suggest that there is room for improvement in the program.

EEF's "Glocal" CI Project Changed the Local Digital Social Structure

Digital social mobility is a process that transforms the social positions of individuals or groups (Sorokin, 2005) in digital society. Encompassing both social climbing and social "declining," it can be measured by qualitative and quantitative changes in indicators of digital social dimensions. But what defines the boundary between the digitally unskilled and the digitally skilled? Community informatics offers a measurable set of boundaries and ways to discuss degrees of digital social mobility.

As shown in table 8, we identified the social class of each of our interviewees in terms of the standards described in figure 2. During in-depth interviews, we asked them to comment on all of the ways their digital behaviors changed after taking a computer course. More than 90 percent of the villagers we interviewed lived in one subcategory of digital poverty—some were material poor, some digital illiterate, some double poor, and others occupied the lowest class. Only four villagers in the sample were members of the digital middle class or digital rich class. The one interviewee in the digital middle class was from Hongda Village; this person's family made their living from greenhouses, electrical household appliances, and computers. This breakdown describes the broader digital society of Tianzhu County. Two out of three digitally rich villagers work as rural clinic doctors; part of their job is to post health information online. We also interviewed a former doctor in Datang Village who had opened a QQ group for the village. The third digital rich interviewee was the director of the Kela Village Resident Committee, a man who is currently in charge of large-scale cultivation of Chinese traditional medicinal materials in his village. He has published information about the village's industries on one of the Chinese wiki-blogs.

Fourteen of the forty-eight interviewees were positively affected by EEF's computer training program; they moved up the digital pyramid as a result. Two more people showed no change. These sixteen people's changes in digital social status are presented in table 9.

Datang Village's doctors and the village committee director owned computers but, before participating in the trainings, were not digital literate. The training helped them become computer savvy. One of the doctors noted that now he uses the Internet "every day":

I have to upload my prescriptions and share cooperative medical care progress with authorities. . . . I surf the Internet via mobile phone. . . .

Table 8. Interviewees’ Digital Social Status Distributions

Digital Social Class	Interviewee Identifier	Percent (N = 48)
Digital elite	—	0.00%
Digital rich	36, 40, 41	6.25%
Digital middle class	25	2.08%
Digital poor		70.83%
Material poor	2, 12, 13, 19, 20, 21, 22, 28, 35, 42, 45, 46, 49	27.08%
Digital illiterate	3, 10, 24, 32	8.33%
Double poor	1, 4, 5, 6, 7, 9, 11, 14, 17, 23, 26, 27, 30, 31, 37, 44, 47	35.41%
Digital poorest	8, 15, 16, 18, 29, 34, 38, 39, 43, 48	20.83%

I get rural doctors’ information from the QQ group run by the County Health Bureau, and I applied for and am running a new QQ group for my village . . . I started learning the basic computer skills these tasks require as a student in EEF’s IT Training Program.

Similarly, the EEF program also helped the village director climb up the digital pyramid:

The first time I used a computer was in 2009. I could do nothing with my own computer, except start it up and watch movies. . . . Then I registered for the computer training course organized by Tianzhu No.1 High School. . . . During the course, I became familiar with Baidu and Google . . . I also registered on a wiki-blog. . . . I want to develop a website for my village, and it seems that in order to do so, we need to pay 3,000 RMB. . . . Can you give me your QQ number? Then we can talk further.

The other rural doctor was originally digital illiterate and had no computer to use—he could “do nothing except push the power on/off button.” His first experience with a computer was through EEF training: there he “learned how to type, use a mouse, apply for, and use, an email account, [and] surf the Internet.” After graduation, he decided to purchase a desktop computer for his clinic. Soon enough he became computer savvy and could search for online health and medical information independently by visiting Baidu Wiki, Dingxiangyuan (丁香园, the most famous medicine online forum) among other sites. He also learned how to upload prescriptions and cooperative medical care information to the official management information system. He now says he enjoys working with computers. He has also begun to transfer his skills by training his wife, who works as a nurse in his clinic.

The only member in the digital middle class in our survey population was the rural seller of household electrical appliances in Hongda Village. He bought a computer in 2006 and a cell phone in 2003, well before EEF’s training started. But he was not computer literate and knew nothing about online searching. Now that he has completed the training, he is able to surf the Internet and use Taobao to check prices.

Table 9. Changes in Digital Social Status as a Result of EEF Computer Training

Interviewee Identifier	Before Training	After Training	Moving Direction
36, 41	Digital illiterate	Digital rich	Two classes up
40	Double poor	Digital rich	Two classes up
25	Digital illiterate	Digital middle class	One class up
2, 12, 13, 20, 22, 45, 46	Double poor	Material poor	Up in the same class/Add digital literacy
23, 27, 44	Digital poorest	Digital poor	One class up
15, 16	Digital poorest	Digital poorest	No change

Seven other participants in our study acquired basic digital literacy through the EEF's computer training program. Although these individuals remain in digital material poverty, they are approaching the boundary of the poor and the middle and will make the transition when they get more access to or purchase their own ICT devices. The three who were originally at the bottom of the digital pyramid started to identify the importance and necessity of ICTs to their lives and jobs; one of them even successfully achieved basic digital literacy through the EEF program.

Elite Villagers' Reproduction of Social Capital Advantages

Those villagers who migrated from being digital poor to being digital middle class or digitally rich occupied relatively high social positions to begin with. They were private entrepreneurs, village doctors, and a village head. They began with larger and denser social networks and were able to reproduce these networks in their digital lives. Our study demonstrated that they benefited economically and digitally from their strong and diverse "back door" 后门 social ties with the county health bureau, township officials, village heads, business partners, and village patients ("back-doorism" can be defined as furthering personal interests by exploiting one's social relationships illegally or unethically); as well as relations with school heads and teachers, and neighbors. Keywords relating to social ties emerge more in their interviews than in others. They have greater exposure to the digital middle class and the digital rich, and even the digital elite, than do common villagers.

The Kela Village head noted the way that his wide circle of acquaintances offered him a great deal of bonding and bridging social capital. When we asked him, "Who do you think is the best-informed in your village?" he replied:

Me, of course. I travel a lot on businesses, and make acquaintances along the way. . . . Also I surf the Internet and make a lot of friends online. . . . I am acquainted with the boss of the Gansu Luanxi Chinese traditional medicinal materials market. His business is to purchase Chinese traditional medicinal materials from local farmers. . . . After I was elected village head, I decide to persuade my villagers to change

their original plans and plant medical materials. . . . When I have difficulties in using the computer and the Internet, I usually seek help from Teacher Tian and Teacher Zhao. . . . Another teacher with the family name of Jia came to my grocery and persuaded me to take EEF’s training class.

Bonding social capital benefits the village head by giving him access to EEF’s computer training program, digital literacy, technical assistance from school computer teachers, public computers in the village committee’s office, and a wiki-blog account registered to him. He uses *bridging* social capital that he has built up on business trips and on the Internet to help him remain digitalized in the physical space of the village. He is thus able to make strategic decisions about his village’s economic development; using search engines, he is able to find prices for Chinese medicinal materials and discover techniques for disease-prevention.

The rural doctor in Kela Village was originally trained to be one of EEF’s seed trainers. At the beginning, he was invited to join the seed trainers’ course by his neighbor, a manager of the Kela Primary School. This manager was successful in persuading him to be part of the initial program. The doctor not only became computer savvy but also purchased two computers—one for his home and one for his clinic. He thus joined the digital rich class. As one of the traditional elites in the village, he keenly grasped the importance of educational and public computing resources, and in the end reproduced his social status in industrial society in a digital context. Still, even though he was an original seed volunteer, he has not passed on his knowledge to other villagers. This is both because of his limited spare time and the EEF managing group’s failure to thoroughly follow-up. The good news is that he is very open to whoever wants access to his personal computers.

This anecdote tells us that a community informatics project is not always uniformly successful and sometimes deviates from its intended strategy. Virnoche (1998) characterized three different sorts of community outreach by the degree—deep, meso, and shallow outreach. Another concept, “elite capture” (Dutta, 2009), refers to the social phenomenon “where resources transferred for the benefit of the masses are usurped by a few, usually politically and/or economically powerful groups, at the expense of the less economically and/or politically influential groups.” Elite capture usually happens when a community informatics project actually only reaches the digital literate, the culturally rich, or the materially rich.

EEF’s “glocal” computer training program chose the local primary or middle school as the hub for its bottom-up executive project. However, the primary and middle schools regard basic educational capital as the prerequisite for the training course. As a result, meso or shallow outreach became its unexpected outcome. A few individuals have exploited well the educational and public computing resources from EEF, Tianzhu No.

1 High School, and the village party branches and residents' committees. One basic and effective means for them to exploit these resources further is their strong social relationships with village leaders. The study demonstrated that exploitation of community informatics programs by the elite in fact deepens the digital divide and maintains an unbalanced digital social structure.

In Hongda Village, traditional rural elites, including village officials, businessmen, and migrant workers who had broader knowledge about the outside world, were included by the primary school managers and village officials in the EEF's training program—in effect, this was an instance of elite “capture” of digital resources. The one interviewee not in a state of digital poverty improved his economic standing only partially with EEF's help; he also relied on his own businesses. The other seven training participants still suffer from digital poverty despite their elite “capture” behavior.

CONCLUSIONS AND IMPLICATIONS

In 2009, the EEF launched its Information Technology Training Program for Rural Areas in Tianzhu County, Gansu Province, and is transforming some Western Chinese villages in a “glocalized” and bottom-up way. The program empowers villagers in three ways: first, they become aware of their information and digital literacy needs; second, they have greater autonomy with regard to access to, and usage of, public computing sites and private computers; and third, rural residents are empowered by value-added information seeking and usage, as their original social capital is increased through online information creation and knowledge sharing.

Bonding social capital builds reliable bridges for Chinese rural families to cross the digital divide or ladders for the digital poor to climb up in the digital pyramid. *Bridging* social capital embedded in nonprofit organizations provides rural areas with high-quality digital materials in Chinese and mobilizes local educational resources as the first step toward the alleviation of digital poverty.

EEF's “glocal” community informatics project can help villagers leverage their positions in the digital social stratification model, or digital pyramid, we conceptualized. Successful digital social mobility was noted in individual cases, and typical cases were described and analyzed. Traditional elites' social capital is reproduced in their digital lives and professions, in that they benefited economically and digitally from their strong and diverse social ties. Elite “capture” of digital resources is a predictable outcome of the EEF computer training program with its shallow or meso outreach. The project needs to plan for the future so that elites do not monopolize all the benefit and thus widen the digital divide. The doctor who “elite captured” his digital literacy learning could prove to be very useful, helping others to acquire the same digital skills he himself learned.

This study was conducted in five villages in Western China, and the methods employed consisted of questionnaires with a moderate sample, focus group, and in-depth interviews, but without deep observation in the training sessions. Community informatics in China is still emerging and forming; its immature nature inevitably affects the developing spaces and quality of research in the academic sphere. More collaboration among academics, governments, local communities, and nonprofit organizations will benefit a much larger portion of the population.

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Appendix A. In-depth Interviewee List and Identifier

Identifier	Gender	Village	Professionals
1	Female	Chakouyi	Grape grower
2	Male	Chakouyi	Grape grower, Village head
3	Male	Chakouyi	Grape grower
4	Male	Chakouyi	Farmer, migrant worker
5	Male	Chakouyi	Store owner, pancake seller
6	Female	Chakouyi	Wheat and vegetable grower
7	Female	Chakouyi	Farmer
8	Female	Chakouyi	Vegetable grower, migrant worker
9	Male	Chakouyi	Farmer, vegetable grower
10	Male	Chakouyi	Vegetable grower
11	Female	Chakouyi	Housewife of a taxi driver
12	Male	Hongda	Farmer, migrant worker, former Associate Secretary of CPC Branch
13	Male	Hongda	Migrant worker, garageman, grape grower, EEF computer volunteer
14	Male	Hongda	Store owner, rapeseed oil producer
15	Male	Hongda	Grape grower, current Secretary's uncle
16	Male	Hongda	Grape and vegetable grower, grape broker, former secretary
17	Male	Hongda	Vegetable grower, sheepman, current secretary
18	Male	Datang	Migrant worker in Angola
19	Male	Hongda	Migrant worker
20	Male	Hongda	Vegetable grower
21	Male	Hongda	Migrant worker, newspaper vendor
22	Male	Hongda	Grape grower, sheepman
23	Female	Hongda	Grape grower
24	Female	Datang	Migrant worker in an Inner Mongolian coal mine

(continued)

Appendix A. (cont.)

Identifier	Gender	Village	Professionals
25	Male	Hongda	Grape grower, household electrical appliance vendor
26	Female	Shimen	Migrant worker, sheepman, Guinea grass
27	Male	Shimen	Sheepman, Guinea grass
28	Male	Shimen	Migrant worker, current Secretary's son
29	Female	Shimen	Housewife, mother of two migrant workers
30	Male	Shimen	Sheepman, Guinea grass
31	Male	Datang	Jockey, folk singer
32	Male	Datang	Sheepman, Guinea grass
33	Male	Datang	<i>No valuable information</i>
34	Female	Datang	Sheepman, migrant worker
35	Male	Datang	Migrant worker, railway builder
36	Male	Datang	Village doctor
37	Male	Datang	Migrant worker
38	Female	Datang	Migrant worker
39	Female	Datang	Wheat and soybean grower, horseman
40	Male	Kela	Village doctor, grape grower
41	Male	Kela	Store owner, village secretary, Chinese medical materials grower
42	Male	Kela	College student
43	Female	Kela	Wheat, soybean and millet grower
44	Male	Kela	Wheat and soybean grower
45	Male	Kela	Farmer, cattleman
46	Male	Kela	Farmer, migrant worker
47	Male	Kela	Farm vehicle driver
48	Male	Kela	Migrant worker
49	Male	Kela	Chinese medical materials purchaser

Appendix B. Interview Guides

In-depth Interview and Focus Group Guideline: Related Questions

Digital Inequality Attributes

How useful do you consider a computer, mobile phone and the Internet?

1. Do you have a computer, mobile phone, or the Internet at home? (If not) Why not?
2. Where and when do you always access computers and the Internet?
3. What do you do online?
4. How do your online behaviors influence your life and job?
5. What difficulties do you always face when getting online? Whom do you always seek for help?
6. Tell us your usage stories of digital tools.
7. How do computers, mobile phones and the Internet help you negotiate with government regarding your concerns?

Evergreen Education Foundation's CI Project

8. Do you know about and how did you know about the computer training funded by Evergreen Education Foundation?
9. Did you ever join the computer training?
10. When and where was it held?
11. What did you learn, and finally how did the training change you?
12. Would you like to be into the computer training again/for the first time?
13. What do you still need to learn from the training? And when, where, how?
14. What do you think of Evergreen Education Foundation?

Information World

15. Tell us your experiences with TV, newspapers, and other information sources.
16. Tell us stories about your information needs and seeking in the past year.
17. Last time, where did you get the information you need?
18. Who do think is the best informed around you?

Public Policy

19. What are your expectations for governments? How should they push the development of public computing?
 20. How should Chinese society develop non-profit organizations on digital technologies?
 21. Do you think your community should promote not-for-profit cybercafés?
-

Appendix C. Questionnaire

Related Questions: Part of the Questionnaire

1. Do you have computer at home? Why not?
 2. Do you use public computer(s)? Where?
 3. Did you ever use the public computer you referred to? Where?
 4. Does your nearest primary school or middle school own public computers?
 5. Can you access the public computer(s) in the nearest school?
 6. How long do you need to walk from home to the school?
 7. Where do you always get farming information?
 8. Where do you always get job information?
 9. Do you know about Evergreen Education Foundation and its computer training project?
 10. Would you like to be involved in the training by EEF?
 11. How long do you think the computer training should be?
 12. When do you think is the best period to start the training?
 13. What skills do you want to learn from the training?
 14. Do you know web2.0 phenomena, like e-commerce, wiki-blog, online games etc.?
 15. Demographic data, including gender, name, age, marriage, child(ren), political status, social ties, and social capital, etc.
 16. Who do you always ask for technical assistance when facing IT difficulties?
-

NOTE

1. In using this term, van Dijk references sociologist Robert Merton, who derived the term from the Bible verse Matthew 25:29. As Billie Holiday sang it in *God Bless the Child*, “Them that’s got shall get, them that’s not shall lose.”

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