Effects of Education and ICT Use on Gender Relations in Bhutan

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Abstract

Supporting gender equality in the deployment of and access to information and communication technologies (ICTs) involves accepting that gender relations and ICTs within any given community are continuously being shaped by one another. There is a growing body of research on gender and ICTs in the developing world. However, little empirical evidence exists on how certain aspects of gender relations can influence the ways that ICTs are perceived and used, framings which can, in turn, reinforce or reshape existing gender norms and practices. This article examines the relationships that exist between gendered access to education and the ways in which mobile phones, fixed phones, and the Internet are perceived and used in a rural and an urban Bhutanese community. The findings, organized by levels of literacy, reveal similar patterns in ICT perceptions and use across the two communities.

Introduction

As tools embedded within existing social and gender relations, information and communication technologies (ICTs) are perceived, used, and appropriated in ways that are subject to asymmetries in power, privilege, opportunity, and choice. Indicative of this are studies examining ICTs in developing countries, which have shown access and usage trends that are, on average, higher among men than women in the same community (Huyer, Hafkin, Ertl, & Dryburgh, 2005; Mitter & Rowbotham, 1995). Furthermore, disparities in formal education between girls and boys, as well as between women and men, have been shown to play a significant collective role in how ICTs are appropriated along gender lines in developing countries (Hafkin & Taggart, 2001; Gurumurthy, 2003), and specifically in Bhutan (Wangmo, 2004). A number of papers have been written examining the role that ICTs play in addressing gender disparities in literacy and education in developing countries (Dighe & Reddi, 2006; Huyer et al., 2005); however, limited research exists on how education levels influence ICT perception and use among women and men, or on how this, in turn, affects gender norms and relations in a given community.

This study examines the perceptions and use of mobile phones, the Internet (as accessed through personal computers), and fixed telephones in Bhutan. Its purpose is to deepen the understanding of how gender relations, organized education,[1] and the appropriation of technology interact with one another. A multiple case study design was applied in two distinct Bhutanese communities—the rural community of Tangmachu and the urban community of Thimphu.

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1. *Organized education includes both formal and non-formal education systems.*

The study is shaped by the following research question: How do gender relations and access to education influence the ways that ICTs are perceived and used in a rural Bhutanese community compared to an urban Bhutanese community? The article begins with a section discussing gender, education, and ICTs, as they form the theoretical basis for the study. This is followed by an overview of the research design, an outline of the two cases being examined, and a presentation and discussion of the analysis. The article concludes with a summary of key findings and implications for future research in this area.

Gender, Education, and ICTs

Gender and technology as a social science research subject is a post-1980 phenomenon (Sørenson, 2000). Its roots can be traced back to the "Women in Technology" movement, which continues to this day to advocate equal opportunity among women and men to access technologies that are neutral in design, production, and diffusion. This position in feminist technology studies has been challenged for placing the burden of change upon women (their socialization, aspirations, and values), instead of asking the broader questions of whether, and in what way, technology and its institutions could be reshaped to accommodate all genders (Wajcman, 2004). Alternatively, the gender and technology discourse continues to acknowledge the gendered nature of technological innovations and the reciprocal relationship that exists between the two (Mitter, 2004; Wajcman, 1991). Mutual shaping of gender and technology refers to the co-influence, co-production, and co-dependence of the two constructs. By examining the impacts and outcomes of technological change, in addition to the intent behind technology design, production, and content creation, this approach posits technology and society as mutually shaped by one another (MacKenzie & Wajcman, 1985; Wajcman, 2004).

Findings from Huyer et al. (2005) indicate a complex relationship between the overall ICT penetration rates in a country and differences in these rates between women and men. Based on statistical analysis conducted across numerous developing and developed countries, the report found that the "relationship between the gender divide and the overall digital divide is very tenuous and does not support

the argument that the two move in tandem" (ibid., p. 145). This illustrates the need to disentangle the social aspects of access from those more closely related to physical (or technical) access (Liff & Shepherd, 2004). The combination of technical and social access tends to be leveraged differently by privileged and powerful groups than by vulnerable and marginalized ones (Warschauer, 2003; Maier & Nair-Reichert, 2007).

Many argue that the Western ethnocentric manner in which empowerment through ICTs is interpreted fails to consider the historical and social contexts within which ICTs are accessed and used (Parpart, Shirin, & Staudt, 2002; Huyer & Sikoska, 2003). Gendered differences in ICT use have been described as "rooted in attitudes and perceptions about technology" (Tolbert, Mossberger, King, & Miller, 2007). For instance, women's time is a critical resource in short supply; therefore, any ICT solution aimed at improving the lives of women and increasing their empowerment and choice must be perceived by those women as a relevant and accessible means to enhance efficiency (for both productive and reproductive labor) rather than as an addition to their existing load of responsibilities (Hafkin & Taggart, 2001; Gurumurthy, 2003). Beyond the limited amount of leisure time many women have away from reproductive and productive tasks, they often lack the necessary mobility to visit public access Internet or telephone kiosks; this may be a symptom of cultural restrictions, safety precautions, or a range of other socio-economic factors (Hafkin & Taggart, 2001).

Improved literacy and education have been linked with a correlated increase in personal empowerment and participation in local and global social communities (Stromquist, 2005). According to Hafkin and Taggart (2001), women in developing countries find themselves in the deepest part of the digital divide, further removed from that experience by men whose poverty they share. They claim that gendered factors such as income, time constraints, language, education, and cultural contexts affect women's access to facilities, training, and employment using ICTs (ibid.). In the South Asian context, Gurumurthy (2003) purports that women's limited access to ICTs is a result of "barriers of illiteracy, preoccupation with survival and constraints of time, in egalitarian and oppressive sociocultural norms and practices, high costs and predominantly urban character of fa-
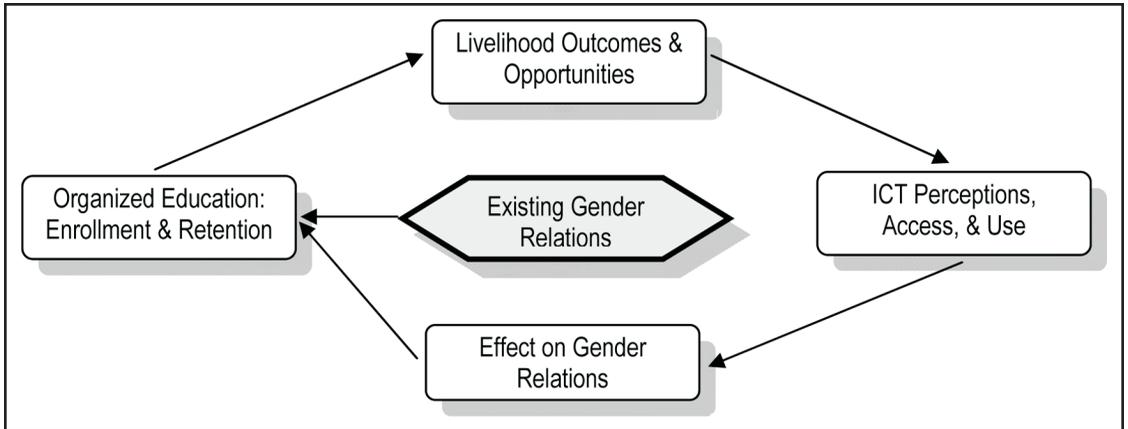
Figure 1. Relationships between Gender, Education, and ICTs.

cilities, and bandwidth limitations." These studies point to education and literacy as critical factors that are, among others, contributing to differential access and use of ICTs among women and men. Drawing from the existing literature on gender, education, and ICTs, the present study narrows the focus to education, considering it as the primary lens through which the mutually shaped categories of gender relations and ICTs may be examined.

Research Design

The research question is examined using a two-site explanatory case study model. The reason for choosing this model is two-fold: 1) The use of a case study design allows for in-depth analysis and contextualization, and 2) the inclusion of multiple sites lends itself to revealing differences in gender norms, ICT availability, and organized education between Thimphu and Tangmachu. The level of organized education is used as the independent variable to examine if and how the introduction of ICTs reinforces or challenges existing gender relations. Figure 1 illustrates the relationships to be examined between the different variables and the logic used to learn more about them. This diagram represents the model adopted in the design and analysis of this study. As for theoretical models, there are a number of caveats that need to be shared with the reader. The first caveat, which relates to the box titled "Effect on Gender Relations," is that the scope of this study does not include a discussion about how perceptions and use of different ICTs influence or affect

gender relations. This is because such a discussion would require longitudinal data collection and analysis, which was not within the purview of this study. The box has been left in the model because it represents an important step that would merit further investigation in an expansion of this study or other studies examining a similar research question.

Other caveats include the following: The arrows shown in the diagram are not intended to suggest unidirectionality or a direct input-output relationship between the incoming and outgoing elements; the directionality of the arrows is to be interpreted only as a means of conveying the relationships examined in this study; the diagram is intended to represent a cycle; and the convergence of the arrows from the "Existing Gender Relations" and "Effect on Gender Relations" is deliberate, as it illustrates the mutually shaped constructs of gender and ICTs, as well as the cyclical nature of this shaping process. As such, the model does not represent universal chronologies or dependencies; rather, its purpose is to visually represent the manner in which this study addresses the research question.

For the purposes of this study, the model is applied as follows: It begins with an examination of existing gender relations and how these norms and dynamics may influence enrollment and retention in organized education. The next stage considers how different levels of education can influence outcomes, such as literacy, which can, in turn, influence opportunities like employability. The following stage in the diagram examines how perceptions and usages of ICTs are influenced by the previous stages in

the model. The final stage in the diagram—though it is not really the final stage, as the diagram represents an ongoing cycle—considers if and how gender relations are influenced as a result of interactions with ICTs. As mentioned earlier, this study was not designed to address this stage; however, it is an important step that needs to remain present in the diagram.

Data Collection

Primary data were collected during a nine-week period at the two sites during the fall of 2006. This was propitiously timed to follow the release of Bhutan's first internationally recognized census and the official launch of the first Internet connection and local telephone system in Tangmachu. Semi-structured interviews served as the principal research instrument for data collection. The structure of the interview allowed for a certain level of standardization across the respondents, while providing ample opportunity to probe and clarify responses. Fifteen semi-structured interviews were conducted in Thimphu, and another 15 in Tangmachu, for a total of 30. All respondents were 18 years or older when the data were collected. Since many of the interviewees did not speak English or Dzongkha, the official language in Bhutan, an interpreter was engaged at each of the two sites. An immediate, direct translation style was adopted when administering the interview and recording data. This process allowed the primary researcher to observe the respondent, take notes in the margin, and interject with probing questions if and when necessary.

Respondent selection was not intended to yield representative samples of the respective populations in the two study communities. Rather, the respondents were chosen based on the overall demographic profile of the two communities, as perceived by the primary researcher, combined with the availability of respondents. As a result, the findings that are discussed in the following section are not intended to be statistically generalizable to populations, but they are analytically generalizable to theoretical propositions (Yin, 2003).

In addition to the semi-structured interviews, 11 key informant interviews (KIIs) were conducted with individuals from a number of NGOs and government offices, as well as private sector representatives. The selection process for the KIIs was based on theoretical relevance to the research question. The results were used to validate initial findings during the field visit. KIIs were conducted with representatives or officials from the National Women's Association of Bhutan (NWAB); Respect, Educate, Nurture and Empower Women (RENEW); the National Commission on Women and Children (NCWC); the Department of Information Technology (DIT), the Department of Information and Media; the Ministry of Labor and Human Relations; the Internet service provider, Druknet; the telephone service provider, Bhutan Telecom; and the mobile telephone service provider, B-Mobile; as well as with two scholars studying Bhutanese culture and society.

Case Background

This section presents relevant background information about Bhutan and the two sites selected for the study. Bhutan is a relatively remote nation-state, both physically and politically, that has undergone controlled and gradual exposure to foreign influences. Since emerging from self-imposed isolation in 1961, the country has traversed a path toward greater global economic integration, all the while maintaining a strong commitment to its Gross National Happiness (GNH)[2] philosophy. Dissimilarities in natural geography between the western and eastern parts of Bhutan directly influence access to roads, electricity, and communications infrastructure. Western Bhutan is home to most of the urban settlements, while the majority of rural settlements are located in the central and eastern parts of the country. Largely an agrarian society—albeit with limited arable land—the majority of Bhutan's cultivated land is terraced on steep slopes. This precludes large-scale mechanization, and it limits efficiency and crop yield.

Gender Relations and Education in Bhutan

Relative to other South Asian countries, the legal status of Bhutanese women is perceived to be pro-

2. The Gross National Happiness (GNH) philosophy is characterized by four pillars: 1) economic growth and development, 2) preservation and promotion of cultural heritage, 3) preservation and sustainable use of the environment, and 4) good governance.

gressive (Wangmo, 2004; Crins, 2004). Much of the literature about the division of labor in Bhutan indicates a limited amount of rigid sex-disaggregation in rural subsistence livelihoods, save for some division of labor based on physical strength (Wangmo, 2004; RGoB 2001, 2003). The Gender Pilot Study (RGoB, 2001) reports that more than two-thirds of women are engaged in primary reproductive tasks in both rural and urban households. There is, however, a paucity of research examining changes in gender identity and relations resulting from shifts in education levels, migration patterns, employment trends, and the introduction of ICTs in rural and urban communities of Bhutan.

Bhutan's National Human Development Report 2005 (RGoB, 2005) describes the education landscape in Bhutan as one that has marked differences across gender, districts, and rural/urban areas. According to Wangmo (2004), literacy levels are at 80% in urban areas and only 33% in rural areas. Furthermore, she points to education disparities between men and women as the biggest constraint to full gender equality in Bhutan.

Monastic education, which was the only type of formal education available in Bhutan before the 1950s, has given men a significant advantage over women in religious, political, social, and economic contexts. Moreover, in the past, families preferred sending boys to school because of the long travel distances, the lack of accommodations and hostels, and other general hardships, but also because of the traditional view that daughters were more vulnerable and were needed at home (Wangmo, 2004).

In 1992, the Royal Government of Bhutan (RGoB) began offering non-formal education (NFE) programs as an alternative system that covered basic literacy in Dzongkha and a range of relevant knowledge and skills in agriculture, health and hygiene, income generation, and social issues. For the most part, NFE classes are held in the evenings to allow students who are occupied during the daytime hours to attend. In general, girls tend to lag behind boys in the formal education system after Class VIII. Moreover, women commonly indicate their desire to attend NFE courses, but they are unable to because of time and mobility constraints (RGoB, 2001).

ICTs in Bhutan

Uneven terrain in Bhutan renders the task of laying cable for ICT infrastructure relatively labor- and re-

source-intensive. Fixed telephone lines were first introduced in 1963; however, many of the remote mountainous regions remain unconnected today. In 2004, 76 of the 201 gewogs ("blocks" in Dzongkha) in the country, or approximately 37%, had access to at least four telephone lines (Wangmo, 2004). A 65% majority of fixed telephone users are concentrated in three major towns of western Bhutan—Thimphu, Phuntsholing, and Paro.

Bhutan's mobile telephone service was launched in November 2003. Since then, mobile telephone uptake has increased at rates unforeseen at the time of its introduction. In fact, at the time of this study, the cellular networks in Thimphu were regularly clogged between 5:00 P.M. and 9:00 P.M. on weeknights, and periodically throughout the weekends (Dorji, 2006). There were 40,000 mobile phone subscribers as of early 2006, a number that represents less than 2% of the population (Budde, 2006). Those who own mobile phones and live in areas serviced by mobile telecommunications providers make frequent use of a technique called "missed calls"—also known as "beeping" or "flashing" in other parts of the world. Missed calls occur when a caller dials a number but hangs up before the call is connected. This type of communication does not incur any cost to either the calling or the receiving party. In addition to cost savings, missed calls allow for discreet exchanges and can sometimes be used as a code language between the sender and recipient. For example, a system can be devised to use sequential or sporadic beeping to communicate simple messages.

First brought into Bhutan in 1984, computer uptake and use was relatively limited due to the lack of a stable power supply at the time (Wangmo, 2004). Initially, computers were used without Internet connectivity. The country's first Internet service provider (ISP), Druknet, was established simultaneously with the country's first national television broadcasting system in June 1999. Internet use today is concentrated in urban areas, mostly at government offices, private businesses, Internet cafés, and some private homes.

Case 1: Thimphu

The city of Thimphu is located in the Thimphu province in western Bhutan. As the country's capital, Thimphu is a relatively densely populated urban center, boasting a high concentration of tourism, gov-

ernment offices, private enterprises, and individuals who speak English, among other languages.

Among the respondents in Thimphu, those who used the Internet indicated their workplace as the most common access point. Personal computers and Internet access are generally still too expensive for most people to have in their homes. Even among the educated elite, only a limited percentage of individuals own a computer, and only a small portion of those have Internet connectivity. Fixed telephone access and mobile telephone access are more widely available and affordable. At the time of this study, there was a single mobile phone calling zone across the country, which means that a call down the street incurs the same cost as a call made across the country.

Case 2: Tangmachu

Tangmachu is located in the Lheuntse province in eastern Bhutan. The only means of transportation to and from the sparsely populated community of Tangmachu is via a feeder road. It takes over two days to drive from Thimphu to Tangmachu along the winding roads that are carved out of the Himalayan mountainsides. Despite the lack of running water, a small hydro power plant at the base of the mountain provides electrification to some of the major structures in Tangmachu, including the local mayor's office and the Community Information Centre (CIC), located on a slight incline nearby.

The CIC uses a wireless signal emitted from an antenna located on the roof of the mayor's office. In addition to providing Internet connectivity to four computers located inside the CIC, the wireless signal is also received by WiFi-enabled fixed telephones located in the 78 households that fall within the antenna's "line of sight." Approximately 400 people who live in and around these homes use the telephones. Calls placed and received from the telephones within the 78-household wireless loop bear no charge to either party; however, calls made outside of this loop are charged according to Bhutan Telecom rates, payable directly to the CIC. Prior to the establishment of this wireless antenna and wireless telephone loop, people in Tangmachu were forced to drive or walk for numerous hours or days (each way) to access a telephone in the town of Lheuntse. No mobile phone service was available in Tangmachu at the time of this study.

Overall, subsistence farming was found to be the dominant livelihood for men and women in Tangmachu. Most residents have little or no command of English or Dzongkha; instead, the strong oral culture is shared using predominantly Kurtoep or Chocangacakha, neither of which have a written script associated with them.

Analysis

As outlined in Figure 1, the analysis presented in this section begins with an overview of existing gender relations based on decisions to enroll and continue participation in the education system. This is followed by a discussion of different opportunities and outcomes experienced by selected women and men from the two sites with different levels of education. The next part of the analysis examines how these individuals perceive and use different ICTs in relation to the outcomes and opportunities afforded by their individual level of education. Complete names of individuals are not used in this article. In their place, a pseudonym (initials sex: age) is used as a method of identification.

Existing Gender Relations and Education

Gender relations constitute and are constituted by a range of complex and dynamic structures and institutions, such as the family, the market, and legal systems (Reeves & Baden, 2000). For the purposes of this analysis, existing gender relations are examined based on the extent to which women and men are able to enroll and continue to participate in the organized education system. Table 1 outlines a number of features at each site that have been identified as contributing factors that could influence the nature and extent of gendered access and participation in organized education.

Existing Gender Relations and Education in Thimphu

Six of the 15 interviewees in Thimphu worked in the civil service. Other respondents included one female elementary school principal, three private business owners, three private business employees, one unemployed post-secondary school graduate, and one housewife (often referred to as a "house minister"). The majority of households included in the study comprised nuclear families.

Non-formal education (NFE) programs are offered

Table 1. Factors Contributing Toward Gendered Access and Participation in Education.

Factor	Tangmachu	Thimphu
Average household size[1]	Large (extended family)	Small (nuclear family)
Ratio of women to men[2]	2:1	1:1
Common livelihood	Subsistence farming	Civil servant or small business
Primary school	Within community	Within community
Secondary & tertiary school	Outside community	Within community
Property acquisition[3]	Matrilineal inheritance	Mostly purchase; some inheritance
Preference for girls vs. boys	Girls	No clear preference

1. National Statistics Bureau (2007). Bhutan Living Standards Survey.
2. Department of Information Technology (2006). Needs Assessment Report. Unpublished.
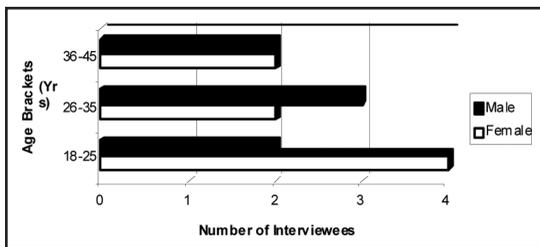*3. Gender Pilot Study (RGoB, 2001).*

Figure 2. Sex and Age Composition of Respondents in Thimphu.

in both rural and urban areas in Bhutan; however, none of the respondents interviewed in Thimphu had ever been enrolled in NFE. Three of the eight women interviewed had no form of organized education, whereas all of the seven men had a minimum of three years of formal education. At the other end of the spectrum, four of eight women, compared to five of seven men, had over 10 years of education at the time of the interview. The Royal Government of Bhutan places a strong emphasis on higher education, and as part of this support, scholarships are made available to promising students who wish to study abroad. Three of the respondents—two women and one man—studied overseas in Japan, Canada, and Singapore, respectively. A large majority of those who study overseas return to Bhutan to work and teach.

One of the questions in the semi-structured interview asked about preference for girls versus boys, if any, and a justification for this position. The respondents in Thimphu shared an equal preference for boys and girls. They all agreed with the principle of equal enrollment for girls and boys in primary school. There was, however, more diversity in opinion on the matter of equity between the sexes in higher education enrollment. Some respondents pointed to the high youth unemployment rates and the need to balance higher education with the need for wage income from adolescents and young adults as a justification for limiting the number of individuals enrolled in post-primary school education. When probed further, these individuals indicated a preference for boys over girls when deciding on whether or not to invest in higher education because of the fact that most women may wish to get married and have children at a younger age, and thus may not wish to invest additional years in higher education.

These observations illustrate how enrollment and retention of children in an organized education system is a burden not only in terms of direct schooling costs, but also in terms of indirect costs related to the loss of income contributing to the household economy (Dorji, 2005). Additionally, Wangmo (2004) frames the higher dropout rates prevalent among girls in increasing education levels as a symptom of family responsibilities, such as marriage, rearing children, or a range of other household chores. Figure 3 provides a graphical representation of formal (Fo) and non-formal education (NFE) programs attended by men (M) and women (F) at the two data collection sites.

Existing Gender Relations and Education in Tangmachu

The most common livelihood of those interviewed in Tangmachu was that of a subsistence farmer. Four of the seven farmers interviewed were women. Two respondents—both female—were shopkeepers.

Other respondents included three female house ministers, one male primary school teacher, one male civil servant, and one privately employed female. Nearly all of the households included extended families ranging from elderly individuals to young children. Adult men between 18 and 45 years were conspicuous by their absence in these households.

Four respondents interviewed in Tangmachu, all women, had attended NFE courses, but had since dropped out, citing inconvenience and lack of time as the chief reasons for leaving. Two male respondents received over 10 years of formal education; one was a primary school teacher who migrated from Paro, and the other was a former monk who had received more than 20 years of monastic education. Among the women who had enrolled in formal education programs, three of the six cited marriage and/or pregnancy as the reason for dropping out of school.

Most respondents in Tangmachu indicated a strong preference for female children. The primary reason given for this preference was that girls tend to stay at home to provide long-term support and care to their households and families, while boys tend to out migrate and have less of a commitment to sustained and long-term household responsibilities.

When probed further, it was found that respondents valued formal education for both girls and boys. However, when forced to choose whom to send outside of Tangmachu to pursue secondary school studies, all respondents revealed that boys would be chosen over girls. The reasons for this choice included physical difficulties experienced when traveling back and forth from school, the loss of labor at the farms, and the need for girls to stay behind and care for the young and elderly members of the extended family.

According to traditional Drukpa[3] norms, land and property are inherited by the eldest daughter, who is expected to take care of her parents and is generally denied an education (RGoB, 2001). As such, a 60:40 female–male land and property ownership ratio prevails in rural areas—most of which is received through matrilineal inheritance—while a 36:55 ratio
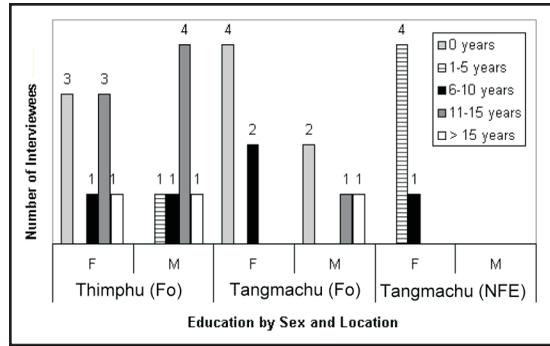

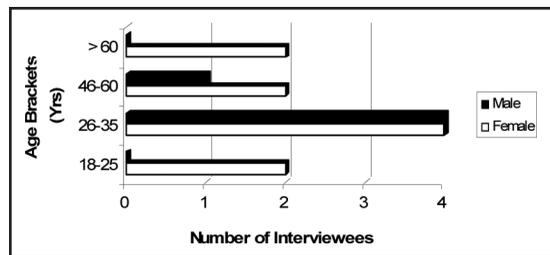Figure 3. Years of Formal (Fo) & Non-Formal Education (NFE) Disaggregated by Sex.

Figure 4. Sex and Age Composition of Respondents in Tangmachu.

exists in urban areas,[4] where most property is purchased rather than inherited (ibid.). Pain and Pema (2004) refer to traditional matrilineal inheritance norms as a double-edged sword, because although eldest daughters generally inherit property, they are expected to stay with their parents and to forego opportunities that might have been afforded to them via formal education.

Outcomes and Opportunities Related to Education Levels

Three case studies have been selected from each of the two sites to examine opportunities and outcomes experienced by people of varying education levels. These case studies were chosen because they represent both sites, a mix of sexes, and a variety of age, education, and ICT exposure and use. From Tangmachu, P (Female: 19) received nine years of formal education and worked as the CIC manager;

3. Drukpa is a term used to refer to people of Ngalong and Sharchop descent in Bhutan. Bhutan's state religion is Drukpa Kagyupa Mahayana Buddhism. Drukpa norms are adhered to by most living in Tangmachu.
4. It should be noted that the ratio reported in the study indicates a base of 91 instead of 100.

ND (Male: 57) received no formal education and was a subsistence farmer and head of his household; and TD (Female: 30) had one year of NFE and was a subsistence farmer and the head of her household. From Thimphu, LD (Female: 24) had no formal education and worked as a cleaner in a government building; KO (Female: 40) received 15 years of formal education and worked as a senior civil servant; and SW (Male: 23) received 12 years of formal education and was a shopkeeper.

Outcomes and opportunities resulting from different levels of education are examined here in two groups: those with less than five years of education, and those with five or more years of education. The threshold of five years was chosen to represent a length of time after which individuals would likely have a functional level of literacy and numeracy.

Outcomes and Opportunities: At Least Five Years of Organized Education

P (Female: 19), KO (Female: 40), and SW (Male: 23) received 9, 12, and 15 years of formal education, respectively. Literacy in English is the most obvious outcome shared by each of these individuals. KO is literate in Dzongkha, but she admits that she rarely uses it in the written form for professional or personal reasons. Although Dzongkha is Bhutan's national language, it is not widely spoken outside of western Bhutan. Moreover, it is considered to be a difficult language to read and write, even for native Dzongkha speakers (Gyatsho, 2004).

P (Female: 19) dropped out of school after nine years of formal education as a direct result of her getting married. She has since divorced her husband. She has decided not to return to school. At the time of this study, P was living at her family home with her extended family. She was in a relationship with a young man from Tangmachu who was studying law in India.[5] Based on her proficiency in reading and writing in English, P was recruited to manage the CIC. The income she earned contributed to her household, while she retained a small amount for her personal spending needs. Working at the CIC allowed P greater mobility within the community due to her daily trips to the CIC and

other visits and meetings as a result of her capacity as the CIC manager. Moreover, free access to the Internet at the CIC allowed her to stay in contact with her boyfriend using instant messaging services. She expressed a desire to migrate out of Tangmachu after her boyfriend finishes school.

KO (Female: 40) studied for many years in Thimphu, in addition to one year in Japan. During her stay in Japan in 2001, KO was exposed to several ICTs, including the Internet and mobile phones. Her education and high level of literacy contributed to her senior position within the civil service in Thimphu. Moreover, the connections KO made through her studies provided her with opportunities to connect with people located in different parts of the world.

SW (Male: age 23) migrated from the eastern district of Trashi Yangste in 1997. His 12 years of formal education provided a strong foundation of literacy and numeracy, which he uses regularly in his job as a shop owner in Thimphu. The education he received in Trashi Yangste was a critical factor in his decision to migrate to Thimphu and to seek a job where he could earn supplementary income to remit back to his family. At the time of the interview, SW felt that his level of education was sufficient to work at a store, but insufficient to get a higher-paying job in the civil service or in the tourism industry.

Outcomes and Opportunities: Less Than Five Years of Organized Education

The selected case studies with less than five years of education include LD (Female: 24) from Thimphu, and ND (Male: 57) and TD (Female: 30) from Tangmachu. TD received one year of NFE, while the others had not received any organized education. All of these respondents were illiterate (or preliterate, as I prefer to classify this group). They all had some level of numeracy.

LD worked as a cleaner in a government building in Thimphu. Spending her first 15 years living in a rural subsistence farming community in the Samdrup Jongkhar district in eastern Bhutan, she migrated to Thimphu nine years ago with her husband, who was working as a police officer. LD

5. Despite the relatively high divorce rate in Tangmachu, this article's author encountered little stigma attached to divorced men or women, or to children born out of wedlock.

spoke Sharchopkha and limited Dzongkha. She was unable to read or write in either language. This precluded her from certain types of work and certain forms of communication; however, her job and functional numeracy allowed her mobility within Thimphu and the ability to use fixed line and mobile telephones. This functional numeracy helped LD tell time and decipher prices in the market. Despite her own preliterate status, LD was fiercely proud of her six-year-old son's participation in school and his keenness to read and write.

ND (Male: 57) was a subsistence farmer in Tangmachu and the primary earner in his household. He had never received any organized education, but he insisted that both of his sons, ages 17 and 19, attend school full-time. When they attended secondary school in a neighboring community, ND and his wife were forced to hire seasonal laborers to help with the work on the farm and in the home. ND was hopeful that his sons would use their education to improve the family farm or seek employment elsewhere and remit money home to sustain the farm. Given the considerable labor required on the farm throughout the year, ND rarely left Tangmachu. Since the installation of the fixed line phone in his home, he had been able to contact his brother-in-law who lives in Thimphu, as well as to receive updates on notable news and announcements around the country. The phone was also used to place orders for his wife's medication, which needed to be filled in Thimphu, and then sent by car or truck to Tangmachu.

Like ND, TD (Female: 30) was a subsistence farmer and weaver. She was the primary earner for her household. Having gotten divorced from her husband 11 years ago, TD lived with her 70-year-old mother and two children. She received one year of non-formal education and was able to recognize numbers. TD had two brothers who had migrated to urban centers. The fixed phone in the home allowed her and her mother to receive calls from outside Tangmachu, and to make calls to other households in Tangmachu free of charge. When her mother needed to make a phone call, TD dialed the number on her behalf. The basic numeracy TD possessed allowed her and her mother to remain in contact with others via the telephone. When asked if she would contemplate migrating to another part of Bhutan, TD responded that she would if she could earn as much as she was earning in Tangmachu. However,

with her basic level of education and the high unemployment levels across the country (Dorji, 2005), she found it best to stay in Tangmachu and continue running the farm and providing for her immediate and extended families.

Based on these case studies, literacy in English—and to a lesser extent, in other languages—is shown to contribute to greater paid employment opportunities for individuals. There are some examples of functional literacy as an outcome achieved by those with less than five years of education, as well as the use of numeracy for making and receiving phone calls, among other activities. The distinction made between literacy and numeracy is found to be noteworthy because it points to the differences in education required for text-intensive versus voice-intensive technologies, as well as to the need to examine these as distinct but related abilities, instead of as mutually exclusive ones. For some, access to education and resulting literacy has led to greater mobility within the local community, within the country, and for some, internationally.

Perceptions and Uses of ICTs

This study's focus on perceptions as well as uses of ICTs is intentional because it addresses specific communication requirements at the individual and community levels. Moreover, perceptions can elucidate the range of circumstances and incentives that might drive one to learn more about an ICT and how it could be used (Tolbert et al., 2007). Different levels of education among the respondents in Thimphu and Tangmachu influenced varying levels of literacy and numeracy. This outcome subsequently influenced social networks, degrees of mobility within and outside the community, and employment opportunities. The distinction between literacy and numeracy revealed the need to examine how the text- and voice-intensity of an ICT affects how it is perceived and used among different groups.

Perceptions and Uses of ICTs in Tangmachu

Not surprisingly, previous exposure to an ICT and the moment of its introduction are found to shape how the particular ICT is perceived. For example, ND was perplexed when asked about the Internet. He seldom visited the mayor's office or the adjacently located CIC unless he had official business, such as

paying phone bills for calls made to Thimphu on his fixed phone line. Since the Internet and fixed telephony were simultaneously introduced in the spring of 2006, ND had assumed the role of the computers was to power the telephone system. Given ND's position as an avid fixed telephone user, combined with his limited mobility due to his duties as a farmer, and his inability to read or write, his perception of the Internet was congruent with his personal circumstances, communication needs, and incentives. ND's misconception of the Internet also revealed the dearth of people in his immediate and influential social network using the Internet at the CIC or elsewhere.

ND demonstrated significant knowledge about mobile phones, despite the fact that there was no mobile phone service available in Tangmachu at the time of the study. His conception of the mobile phone was shaped by impressions from his brother-in-law in Thimphu, with whom he had frequent interactions over the fixed telephone. In addition, ND's exposure to individuals visiting Tangmachu who displayed their mobile phone hardware was found to play a role in his perception and knowledge of mobile phones. This finding contributes to a counterintuitive situation, whereby ND was aware and interested in mobile phones, which were not available in Tangmachu, yet he misunderstood the role and functions of the Internet and computers, which were available at the CIC in Tangmachu that he periodically visited.

With more than five years of education and a high level of literacy, P's perception of the Internet was considerably different from ND's. P discussed how her perception of the Internet changed significantly after she accepted the job as CIC manager. Before that point, P did not have a clear idea of what the Internet was or how it was used to communicate with other people. Since then, she had gained considerable experience using the Internet, stating: "The Internet is like a window to help me stay in touch with the outside world—mostly with my boyfriend who is currently studying in India. I chat with him almost everyday." In this case, P's unlimited and unsupervised use of the Internet, in addition to a social network that included ties with other individuals who use the Internet, contributed to her perception of the Internet as a transformative tool in her life.

Relative to mobile phones, the Internet was irrel-evant to ND's communication needs. However, he perceived the fixed telephone as a transformative tool. In addition to calling family members living outside of Tangmachu, ND also made periodic calls to Thimphu to place orders for his wife's medication. When asked how he felt about the cost of calling outside the local wireless loop to place these orders, ND responded that the cost of making periodic calls to Thimphu was far less expensive than traveling to Thimphu to do it in person. This efficiency relates to the shorter lead time required to order the medication and the reduction of labor time lost on the farm due to travel.

Perceptions and Uses of ICTs in Thimphu

Each of the three ICTs being examined in this study was available in Thimphu at the time of this study. KO had access to fixed telephones at home and at work; she also had free access to the Internet at work and was among the few people in the country with Internet access at home. KO owned a mobile phone. She began using mobile phones as early as 2001, during the year she studied in Japan. This predates the introduction of mobile phone service to Bhutan.

KO expressed her perception of the Internet as transformative in nature. She referred to it as a tool for democratization, a means to strengthen ties in social networks, and a repository of information and knowledge. On a less positive note, she pointed to a perceived increase in back problems, eye strain, and obesity due to long hours spent at computer screens.

When asked about her perceptions of mobile phones, KO commented on a range of advantages, including strengthening social networks, increasing incomes, and facilitating communications in times of emergency. However, she also pointed to a number of perceived drawbacks, such as safety hazards and diminishing face-to-face social interaction due to the disruptive nature of mobile phones. She discussed two specific potentially negative impacts of mobile phones: the rise in traffic accidents caused by a spike in the number of motor vehicles on Bhutanese roads and the irresponsible use of mobile telephones while driving, and the possibility that increased interaction with mobile phones can weaken traditional face-to-face interaction and familial bonds.

The balanced overview of beneficial and potentially harmful effects of mobile phone use provided by KO is significant for several reasons. Her ability to easily and affordably access and use a wide array of text- and voice-intensive ICTs on a regular basis (fixed telephones, Internet-enabled computers, television, and radio) enables her to situate the mobile phone along a continuum of ICTs. This, in turn, translates into a restricted niche being satisfied by mobile phones. As a result, it is the mobility attribute of mobile phones that surfaces as the predominant trait. This trait, in her opinion, can manifest itself in both positive and negative ways.

LD's perception and use of mobile phones and the Internet differed substantially from KO's. LD was preliterate, yet she possessed functional numeracy, as evidenced by her ability to recognize numbers on a phone. When asked about the Internet, LD indicated the term was familiar and that she had heard employees in the building she cleaned referring to it; however, she was unclear on what the Internet was, and how it was used. When asked to explain her perception of the Internet, LD described it as a concrete, tangible commodity such as milk or eggs that could be purchased at a store and then inserted into the computer, akin to a mobile voucher being used to top up a mobile phone. Relating the concept of the Internet to mobile phones illustrated the way in which LD's perception of the Internet was associated with the prepaid voucher system she used for her mobile phone. This in many ways mirrors the perception articulated by ND in Tangmachu, as the two respondents associated the Internet with the voice-intensive ICTs with which they were familiar.

LD did not have access to a fixed phone at her home, but she had monitored access to one in her workplace. She owned and had access to her own mobile phone. As was the case with the majority of mobile phone users in Bhutan, LD used pre-paid mobile phone vouchers to add credit to her account. She benefited from the single national calling zone when calling her family and often used the cost-free "missed calls" when she ran out of credit. Many parents in Thimphu equip their children with mobile phones and have them send missed calls to notify them through a predefined sequence or code. For example, a single missed call could imply that a child is leaving home, and a double missed call could imply that the child has reached home safely. By using such means, individuals are able to communicate with one another in real-time without paying a single Ngultrum (the currency in Bhutan).

Overall, LD perceived fixed telephones as an inferior option relative to her mobile phone—especially as a woman, wife, and mother—because of the fixed phone's limited privacy and the need to remain stationary for extended periods of time. She tended to use the fixed phone in her workplace to return missed calls received earlier on her mobile phone.

Comparing the perceptions and use of the same ICTs across different users—such as by KO and LD in Thimphu (mobile phones), and by P and ND in Tangmachu (the Internet)—reveals the effects of different gender relations and related opportunities and outcomes on the way in which these ICTs are situated within individual contexts. Issues that are commonly thought of as being deterrents to use, such as cost of access, have been shown to be mitigated when the incentives to use are perceived to exceed them. These incentives include increased privacy and mobility, improved ability to strengthen social networks with family members living far away, and enhanced convenience and efficiency by virtue of eliminating costly travel.

Summary and Conclusion

The types of ICTs in use and the year in which they were introduced varied between the two sites examined in this study. Despite this contrast—and other contrasts in geography, culture, livelihoods, language, and infrastructure—the relationships between gender, education, and perceptions and uses of ICTs in Thimphu and in Tangmachu largely mirrored one another when comparing similar education levels across the two communities. The role of literacy and numeracy were found to be influenced by existing gender norms, and the increased opportunities stemming from higher levels of education included broader social networks, enhanced employability, and increased mobility. The relevance and existing use of a particular ICT among others in an individual's social network played a critical role in how the technology was perceived and used by that individual. Moreover, the strong oral culture in Bhutan, coupled with the limited use of English and Dzongkha in many parts of the country, point to the need for further examination of ICTs that favor either text or voice, or a combination of the two.

The analytical model used in this study captures

the mutual shaping of gender and ICTs as examined through the lens of organized education. The cyclical structure of the model indicates a feedback loop, whereby the gender relations that are shaping access to education and ICT perception and use are then reshaped, reinforced, or modified by the effects of ICT use within people's lives. The effect of this feedback loop was not examined in this study, as it would require longitudinal data collection and analysis to uncover gaps and trends within the evolving communication needs of the respondents. It is recommended that perceptions of ICTs, as well as traditional access and usage statistics, continue to be monitored. Moreover, a systems-oriented approach is recommended when examining the mutual influence of gender relations and ICTs. This would include, among other potential considerations, examining initial exposure to different ICTs; existing and evolving communication incentives and needs; exposure to different ICTs that are voice-intensive, text-intensive, or a combination thereof; and levels of education and functional literacy and numeracy. ∎

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