International Forum
Vol. 15, No. 2
October 2012
pp. 5-15

FEATURE

The Digital Divide After 20 Years: A Rural Philippine Perspective

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Abstract. *The digital divide is still a real concern in the developing world; however, strides are being made to overcome information technology gaps with the developed world. Given the changing patterns of technology usage, this study explores what the digital divide looks like today in a small, rural school community in the Philippines. This paper examines self-declared computer knowledge of high school students, college students, and teachers. The overall level of computer knowledge was found to be low, and no significant differences were found between the students and teachers. Implications of the findings include the fact that with both student and teacher knowledge being low, there is little motivation or support for either students or teachers to improve.*

The *digital divide* is an expression that was coined in the mid 1990s as a label for the "social gap between those who have access to and use computers and the Internet" and those who do not (Williams, 2001, p. 2). There is a great deal of information available only in digital form, which cannot otherwise be acquired, thus putting communities without Internet at a distinct educational disadvantage (Ramos, 2008). This gap was observed, with some alarm as being a "persistent and widening disparity" (Ramos, 2008, p. 2; Tiene, 2002) between those who had access and those who did not. To understand the enormity of the global extent of this divide, consider that in 2003, for example, computer ownership in the U.S. was 6 computers per 10 people, while in India, it was only 6 per 1000 people (Chinn & Fairlie, 2004). By 2010, this same comparison was 7.6 computers per 10 people in the U.S., while India had progressed to 6.1 computers per 100 people (ITU, 2012). The gap is closing, but there is still a long way to go. The fear that this difference is not only indicative of a current problem, but that it might also impede economic and educational progress in the developing world, has motivated many research studies on the global digital divide and its implications. As one Filipino author so aptly stated, "Simply put, information access is needed for development" (Ramos, 2008, para. 1).

Chinn and Fairlie (2004) investigated the extent of and causes for the divide on a global level, finding that income differential is the single greatest factor accounting for the digital divide, but by no means the only factor. Henry (2004) looked at regional issues in the Caribbean pertaining to technology usage patterns, economic growth and poverty reduction. In his 2002 study on education and the global digital divide, Tiene noted that Asia had nearly 1/3 of the global Internet users, however, this amounted to locally less than 1% of the population. Access in a region is clearly not the same as access for the general public.

Technology has been seen as holding "the potential to narrow the differences in the quality of citizen services between developed and developing countries" (Bangladesh Enterprise Institute, 2010, p. 9) and to support economic development. For that reason, aid organizations and governments alike have been working hard to reduce the digital inequalities in the world. Without question, the developing world is entering the digital age. People in developing countries still may not have access to technology in the same quantity or quality as the developed world, but there has been a lot of improvement in recent years. Countries like Bangladesh have proclaimed a new motto for themselves as "Digital Bangladesh" (Bangladesh Enterprise Institute, 2010), the Philippines is known as the cell phone capital of the world (Mendes, Alampay, Soriano, & Soriano, 2007), and Rwanda is transitioning to an English-medium country, positioning itself to be a technology hub for East and Central Africa (Baldauf, 2007; Randell, 2008). India has stepped into the role of leading out in technology changes not only regionally, but also globally (Ahuja, 2000).

The question is, is the global digital divide static or changing? Is the real gap between rich and poor nations in terms of technology availability, knowledge, access, and information growing or shrinking? How does it compare to usage patterns in the developed world? What do actual computer knowledge patterns look like in the developing world? Is this different in the cities vs. in the provinces, as is the typical pattern found outside the developed world? This small study was designed to review the global trends and to explore local patterns of technology knowledge in a rural setting in the Philippines, in order to shed light on the larger picture of technology knowledge, which is one aspect of the digital divide in the developing world.

Review of the Literature

The divide between rich and poor in terms of access to technology is shrinking, regardless of how it is measured, according to economists from the World Bank (Fink & Kenny, 2003). While the gap in 2003 had slightly widened in absolute terms, Fink and Kenny (2003) found that developing countries were spending more on information technology (IT), having better access based on per capita income estimates, and having faster rates of technology growth in terms of infrastructure, to name a few. One study, however suggests that the digital divide would be even greater if the developing world did not have such a young population (Chinn & Fairlie, 2004). In spite of the challenges, even as far back as 2003, Fink and Kenny optimistically reported that "The most stunning feature of the digital divide is not how large it is, but how rapidly it is closing" (p. 6). They go on to suggest that, while the digital divide is important, it should be kept in perspective: alongside access to health care, food, water, and disease control, it seems important, but not urgent. They see it more as an educational opportunity, which is affected by the urban vs. rural divide, and the rich vs. poor difference, but as being a concern that will eventually balance out in the long run, in the same way as other development issues have done.

Indonesia, India, Brazil, Russian, and China have recently been singled out as having not only 45% of the world's population, but also as being poised to become the new technology super-users of the world (Aguiar, et al., 2010). In their study conducted by the Boston Consulting Group, Aguiar and colleagues paid special attention to China, as

> The unexpectedly rapid pace of China's online migration is a sharp reminder of how quickly . . . other . . . markets are likely to evolve in terms of Internet penetration rates, the number of hours spent online per day, and e-commerce adoption. (p. 4)

Aguiar et al. predict that by 2015, these 5 nations will have 3 times the number of Internet users as the US and Japan combined.

Meanwhile, the effects of the divide, even if it is shrinking, are still being felt in the developing world. In addition to finances, educational levels have been known to affect Information and Computer Technology (ICT) access (OECD, 2001; Tuaño, 2007), and this is an added problem for developing countries. In Southeast Asia, the contrasts between the haves and the have-nots are particularly strong. The region contains countries like South Korea, which has the highest rate of connectivity in the world (Chinn & Fairlie, 2004), as well as countries like Myanmar and Bangladesh, who have traditionally been in the bottom 10 or 20 countries worldwide as far as technology access is concerned.

In the Philippines, cell phone technology is readily available, with about 86 cell phones per 100 people in 2010 (United Nations Statistics Division, n.d.). This has rendered wired connections to telephones and the Internet almost irrelevant. The rate of computer ownership in the Philippines, however, was only 7 per 100 people in 2006. The number of Internet users, however, skyrocketed in the next 2 years, from 6 per 100 in 2008 to 25 per 100 in 2010 (United Nations Statistics Division, n.d.). Many people still may not have a computer, but they are connected to the Internet through their cellular phone. These numbers are difficult to determine with accuracy, for many reasons. By way of comparison with the UN data, in 2007, Internet usage was estimated at 2.84 per 100 by one source, 6.03 by another, and 16 per 100 by yet a third source (dela Peña et al., 2010).

Rural access to technology has been cited as the litmus test for bridging the digital divide (Internet World Stats, 2011). In the rural areas of the Philippines, the problem of gaining access to technology is especially acute (Ramos, 2008). Ramos (2008) explains that while in the cities, the infrastructure is available for Internet access; in the provinces there are physical limits of accessibility, and even if it is available, the costs are prohibitive. His paper describes multiple projects currently underway in the Philippines to bridge the connectivity gap in rural areas, including several organizations that support technology for rural schools, deployment of new forms of wireless technology, solar-powered equipment, and systems adapted to specific, local concerns. But if the problem of rural access is to be truly addressed, many similar initiatives will be needed. Unfortunately, the problem of access to technology is only the tip of the iceberg when it comes to bridging the digital divide. Recently, Trucano (2010) has reminded us that "a second digital divide separates those with the competencies and skills to benefit from computer use from those without" (para. 1). He goes on to explain that this second divide lies "at the core of the educational challenge faced by many countries today" (Trucano, 2010, para. 7). Unless the developing world can help its citizens learn the needed skills to take advantage of the opportunities technology can offer them, access in itself will not create change. It is this second divide—the knowledge gap—that this study explores.

Given the rapidly changing patterns of technology usage in the world, this study is designed to explore what the digital divide looks like, in terms of computer knowledge, in a small, rural school community in the Philippines. How much do rural students in the Philippines know about computer use? How does this compare with others, and with their teachers?

High schools (currently beginning at age 12 in the Philippines, free, but not compulsory) are required by law in the Philippines to include technology in the curriculum. A recent Philippine Department of Education (DepEd) memo reveals that most public high schools in the Philippines are now considered to have computing facilities, and that the focus is now shifting toward supplying computer laboratories for elementary schools (Republic of the Philippines, 2011). College students (college currently begins at age 16) typically have to take a computer course as part of their general education requirements, and Internet Cafes are common, even in many semi-rural communities. Yet, the rural vs. urban divide apparently continues. The questions addressed in this study include whether there is truly a rural vs. urban computer knowledge divide in this location in the Philippines, whether age and role (teacher vs. student) are significant predictors of computer knowledge, and, quite simply, how much teachers and students in this rural school community actually know about computers and the internet.

Method

This descriptive study surveyed 100 students and 37 teachers in a rural high school/ college setting in the Philippines to find out their knowledge about computers, and to see if there were differences between faculty and students, as well as by age, gender, and other demographic variables. These participants have all supposedly had training and experience in technology, given government requirements for the educational levels at which they are studying/have studied. The participants were all the attendees at a school-wide seminar. The instrument used was a slightly customized version of the *Digital Literacy Self-Assessment* (Revere, 2005; used with permission), comprised of 80 questions divided into eight skill areas. Modifications of the instrument include removal/adaptation of institution-specific items and updating of items to current technology (such as replacing “floppy disks” with “USB drives”). The instrument asked questions about whether the individual could accomplish specific computer procedures, and was answered with Likert-type responses of 0 = No or unlikely, 1 = Not sure, but likely, 2 = Yes. The original instrument was designed for US college students, and set proficiency level as being 80% of the total possible points, or 128/160.

Results

The data from this descriptive survey showed that overall knowledge of computers was not statistically significantly different between faculty and students. On overall knowledge, the students edged out the faculty by a few points overall with an average of 72/160 (45%), whereas faculty averaged only 68/160 (42.5%). This difference in means was not statistically significant, however, due to the large variance within each group. There was very high variability in both students ($M = 72.3$, $SD = 34.26$) and faculty ($M = 68.5$, $SD = 44.79$), with both groups having individuals who scored 140/160 (87.5%) or higher, and both groups having individuals who scored 0/160.

At the University of Washington where this instrument was developed, students who scored below the 75% mark on any section of the self-test were expected to take remedial instruction in that area (Revere, 2005). According to this proficiency guideline (120/160), the averages in the present study show a distinct gap (the digital divide?) between what is and what should be. Of the teachers surveyed in this study (see Table 1), only 6 of 37 (16%) considered themselves to be overall proficient, based on this 75% rule, and only 12 of 100 (12%) of the students. There were also several individuals among both students and teachers who considered themselves as not at all proficient at computer usage (scoring less than 20% on the survey).

Table 1

Overall Computer Proficiency

	Teachers' proficiency		Students' proficiency	
	Number	%	Number	%
Proficient (75% or above)	6/37	16%	12/100	12%
Not Proficient (20% or below)	8/37	22%	15/100	15%

Note that the numbers of proficient students and teachers were similar, with teachers having a slight edge (see Table 1). When it comes to total lack of computer ability, however, there were more teachers than students who scored very low. That is to say, students, in general, scored more in the mid-range, with teachers having more of a bimodal distribution—either knowing quite a bit, or nothing at all. Nearly 1/4 of the teachers were not proficient at all in computer technology usage.

It should be noted that a mean score of 70/160 on the instrument, which is what both students and teachers obtained, represents less than 60% of the score that would be required for proficiency. This can be compared to a recent study done in the US by Hignite, Margavio and Margavio (2009), where the average score obtained by college students was 94% of the required score for proficiency. This suggests that the gap in information technology knowledge between the developed world and the developing world, while possibly holding steady or even shrinking, certainly is still an important issue to be addressed.

One early study on rural schools in the US (see Marshall & Bannon, 1985) found that teachers had greater computer knowledge than students, and also that males knew more about computing than females. No significant differences were found overall in this study by gender, age, or discipline. Teachers, when taken alone, however, did have a significant difference by gender, with males ($M = 76.5$, $SD = 38.94$) knowing more about technology than females ($M = 58.2$, $SD = 35.34$). This is only a theoretical difference, however, since the instrument was of self-declared ability, and it has been shown that men have a tendency to be more self-confident than women (Busch, 1995). It has also been found that men have better computer skills, at least in more complex tasks, whereas in basic tasks, men and women performed equally (Kay, 2007).

Table 2 shows the reliability and descriptive statistics for the digital literacy instrument used in this study. Clearly, the instrument is reliable, and there are also differences between different skill areas, with System Maintenance and Internet Searching being the areas of least knowledge. The area of highest knowledge was Word Processing, with Basic Computer Usage being the second highest area.

Four of the 8 scales had a mode of 0, showing that many people have no knowledge in those areas.

Table 2

Reliability and Descriptive Statistics for Digital Literacy Self-Assessment

Skill area (# of questions)	Cronbach's alpha	Mean	Median	Mode
Basic computer usage (10)	.856	1.11	1.20	1.1
File management (10)	.896	1.00	1.00	1.1
System maintenance (8)	.910	.57	.38	0
Word processing (10)	.923	1.34	1.50	2.0
Basic internet (11)	.868	.80	.80	1.1
Internet searching (11)	.897	.52	.42	0
Spreadsheet (10)	.951	1.08	1.10	0
PowerPoint (10)	.965	.75	.65	0

Discussion

Though the data set is small, some interesting implications are clear, particularly if we presume that this rural location is typical, which seems reasonable. The fact that few students or faculty members are highly skilled technologically means that the pressure to learn additional technical skills will be significantly lower than in places where at least one of the two groups has better technical skills. Faculty members who are not technologically capable cannot (and will not) demand that students use information technology, and students will not have ready access to assistance (either from faculty or from peers) when there is need. This lack of knowledge by both teachers and students, resulting in little motivation for change is perhaps the most worrying of all the patterns in the data analyzed for this study. In a rural setting, teachers have certain advantages of access to infrastructure that students may not have had during their growing up years. Given that they are teaching at an institution that has a computer laboratory, they have technically had access to information technology for a long period of time, but have not learned it. If the students are also weak, teachers will not feel a need to update their own skills like they would if their students were ahead of them in technical ability.

The few students with good information technology skills are likely to be able to leverage their abilities in information technology, even to the point of receiving better grades for their work. This is regardless of whether they actually know more about the topic or not. But their ability to find additional information, or to make things look nicer is likely to help them at least appear more knowledgeable than their classmates (see Bear, n.d.).

This general lack of technical knowledge may well discourage students who come in as knowledge leaders from continuing to develop intellectually, thereby stunting their growth and resulting in graduates that have skills which are lower than what is required in the marketplace. In the same way, teachers who might be knowledgeable when employed at a school may not be pushed to continue learning, which means they will quickly fall behind societal norms, since the level required is an ever-moving target.

It is clear that both students and faculty need to develop their information technology skills across the board. If this problem persists, it is likely that this institution's graduates will struggle to find employment in 21st century organizations. Given that institutions of higher education are frequently evaluated by the ability of their graduates to find good employment, this is likely to be a crucial factor limiting the interest on the part of parents and students in enrolling at this institution, eventually calling into question the long-term viability of the school.

Further research should be done to confirm if this situation is typical of higher education institutions in rural areas in the Philippines (and possibly other developing countries). If this situation is not an isolated case, it demonstrates the need to rapidly upgrade the knowledge of rural institutions so that their graduates can be active contributors to the development of their region.

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