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Educational Computer Use in the Schools of Southern Belize

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Educational Computer Use in the Schools of Southern Belize

Developing countries are defined by their lack of wealth (The World Bank, 2011). This means that many of the educational innovations that developed countries take for granted, such as computer availability, may not be as accessible for educational use in developing countries. This use of technology has become an important educational tool in most nations, as increasing comfort with and knowledge of its use plays an important role in the academic development of students. In the United States, greater access to technology based instruction has increased along with more access to computer-based technology (Russell, Damian, O'Dwyer, & O'Conner, 2003). Although technology can make learning more engaging for students (Ljungdahl, 2001), lack of resources are likely to limit the ability of schools within economically challenged countries to provide these opportunities. This is true in southern Belize due to this region's economic challenges. What is the state of technology in the schools of this area? The purpose of this study is to report on a technology survey given to the principals of the Toledo district of Belize in a meeting held in October 2010. The survey suggests that the schools lack basic resources to provide an academic foundation in technology to the students of this district.

The Toledo District of Belize

Belize is an economically poor country, and the southern region is the most impoverished. The indigenous Mayan population makes up 70% of the Toledo district (Richardson, 2007), and they are predominantly farmers and fishermen using antiquated methods to harvest their crops (Levasseur & Olivier, 2000). Cultivation of crops is primarily done through manual labor. While fishing is a major contributor to the region's economy, this is also done by the labor intensive method of diving rather than through a more mechanized method used in more industrial countries. Although timber is an important export for the southern region of Belize, it has created problems for the Mayans because it destroys the rainforests and deprives them of the natural resources they need to survive. An ever increasing network of roads has brought with it an increase in modernization. This is evident in that the Belize government has provided most villages with a central water system and electricity, and community phones are available in some rural areas (Southernbelize.com, 2011).

This reliance on subsistence farming practices has the outcome of limiting income. Seventy-nine percent of Toledo resident are below the poverty level, which is considered the income needed to feed, shelter, and clothe an individual. The income needed to be above poverty level for this region is 118.40 United States dollars a month (Richardson, 2007). There is little discretionary income to spend on technology.

School affiliations can create a difference in resource allocation. Belize, which was a British colony until 1981 (Payne, 1990), retains the church-state entanglement of the mother country (Lewis, 2000). There are both religiously affiliated and government schools in the Toledo district. Both types of schools received government funds for the payment of teachers. However, schools with religious affiliations may have a few more resources that come from organizations of the faith. This potential increase in funds is still likely to provide little regarding technology.

Along with the obstacle of finances, there are other practical reasons for difficulty in improving technology in the schools of southern Belize. First of all, Belize is both hot and humid (Belize National Meteorological Service, 2011). Punta Gorda, the largest town in southern Belize with a population of less than 6,000 (Southernbelize.com, 2011), has a temperature range that extends from the high 70s to the 90s Fahrenheit (Belize National Meteorological Service, 2011). Since much of the Toledo schools are located in or near a rain forest, there is constant high humidity. In terms of computer longevity, the weather becomes an obstacle that must be controlled through other technologies such as air conditioning.

None of the schools in southern Belize have central air conditioning, so computers must be maintained in a room with a window unit to keep the environment conducive for long-term functionality. Most rooms are open to the outside environment; thus, dust can create problems with the lifespan of the computers and other hardware. Lack of air conditioning is only part of the problem. Many schools lack electricity, and those that do, have regular outages. The resulting surges create problems with computers often requiring repairs. Once repairs are needed, technology support may be lacking.

Computers in Developing Countries

Belize Computer Lab

There are initiatives to bring computers to developing countries. This is thought to help these countries to eventually increase economic development, as human development is a precursor (Wheelan, 2010). There have been few research studies conducted regarding the use of computers in Belize schools, but the few that exist suggest a lack of access. For example, Van Horn (2005) discusses the potential benefits of the Internet among teachers in Belize who have few books to share with students, but of course, the lack of technology makes the point mute.

Accessing the Internet is often a luxury that developing countries cannot afford. Although cell phones may be fairly common in these countries, there are still costs that can be prohibitive for more powerful technologies (Talukder & Das, 2010; Paterson, 2007). These costs are often exacerbated due to regulations that humanitarian groups place among those who receive gifts of technology. James (2010) criticizes the one-laptop-per-child project that brings computers to schools, but has strict limits on sharing. These regulations increase costs and limit expansion of computer knowledge.

These regulations may be particularly ineffectual if the purpose of a computer program is to lead toward self-sufficiency. Long term computer use in developing countries may require an emphasis on sharing (James, 2008). There are several arguments for and against a sharing program, most of which are due to social interactions. However, sharing has a characteristic important to developing countries: Less cost.

Method

Surveys are common in research to elicit specific information from participants. Information gathered in this manner is generally not concerned with "characteristics of individuals as individuals" (Best & Kahn, 2006, p. 121) but with the results of the data that are taken from the statistics drawn from the individuals. Surveys have been shown to be effective in reviewing opinions, attitudes, interests and other common measures in education (Suter, 2005). While surveys can take many forms, the most commonly used survey is the written questionnaire. Formats can range from a check-list to open-ended questions. The survey method is often used to gather data from large numbers of participants at a particular point in time (Best & Kahn, 2006).

This research used a survey with two checklists in matrix question format (Neuman, 2000), and closed and open-ended responses. This survey was designed to determine the current level of computer use and knowledge among teachers and students, as well as problems associated with this technology.

This study used a convenient and complete sample of principals in the Toledo district of Belize. These principals were surveyed in a workshop held in a collaboration between the Toledo Ministry of Education and the humanitarian organization Teachers for a Better Belize. The researchers were regular participants in the workshop, and the survey was designed to collect information on current technology status, as well as determine future training needs.

Results

Descriptive statistics. The participants in this study were primary school principals in the Toledo district of Belize. Most of these principals ($n=37$) were in rural schools with an enrollment range of 28 to 893 students ($M = 175.9$). The number of teachers these principals had on their campuses ranged from 2 to 36 ($M = 7.8$).

Computer use. The survey results indicate that 40.5% of the schools do not have any computers. This lack of access is further exemplified by the 75.7% of schools that have five or fewer computers. Nine schools (24%) have more than five computers for student use. Two schools have more the 50 computers, with 62 being the largest number in one school. Internet accessibility is unusual, although 22% of survey participants indicated that their school has the Internet at least some of the time.

The surveys suggest there is a wide-range of difference in student computer use depending upon the school. Feedback was solicited on how often students use computers in general, word processing, presentation software (i.e., Powerpoint), and Internet. Forty-six percent of respondents (n = 37) said use of computers was not available, and another 8% indicated that computers were available but they were never used; thus, 54% of the schools have students who never use computers. Another 11% of respondents indicated that students use computers only once or twice a year, 19% use them weekly, and 16% have daily use.

Responses regarding student use of word processing (n = 36) found that 47% do not have access, 14% never use this software, 8% use it once or twice a year, 22% use it weekly, and 8% use it daily. Presentation software, such as Powerpoint, was used less often. Seventy-five percent never use it (either do not have the computers, software, or do not use the program), 17% use the software once or twice a year, 6% use it weekly, and 3% use it daily.

The survey question regarding student Internet use found that 70% of respondents (n = 37) did not have access. Other responses were that 8% never used it (there was the assumption with this question that availability was a possibility), 5% used in once or twice a year, 5% used it weekly, and 10% used it daily.

Computer use in the home was estimated by respondents. This query found that 49% of Toledo principals (n= 35) believed that none of their students had computers at home. These respondents answered at an 86% rate that fewer than 5% of students had access to this technology. Only five principals (14%) speculated that over 15% of students had computers at home, with the highest estimate being 30%.

Technology problems in southern Belize. The respondents were provided the opportunity in the survey to check the extent of the problems associated with teacher training, computer hardware, computer software, out of date equipment, computer breakdown, cost of supplies, and computer space. Table 1 exhibits the responses to these potential computer problems. (See Table 1)

Table 1 suggests that many of the potential issues with computers are considered problematic in the Toledo district of Belize. A review of this section of the survey suggests some limitations to this table. Some principals checked "not a problem" to these questions, but their school had no computers or electricity. This suggests the response was due to the inability to have computers, which was not the intent of the question. Despite this limitation, table 1 illustrates generally perceived problems with technology use in this region of Belize.

Biggest concern regarding technology. The principal respondents were provided an open-ended question stating "What is your biggest concern regarding technology?". There were 29 respondents to this question, and two major themes emerged from the data: Problems with physical capital and computer breakdown.

Physical capital problems were listed in 62% of the answers. Some of these responses included "need air conditioner", "need more computers, training, and short of ink", and "need more computers in our school (with use of Internet)". Many of the capital problems related to the region's infrastructure, such as "no electricity or computer", "school is located in a remote area, unavailability of electricity", and "no Internet service, no telephone". Some indicated progress toward more computer use through the use of solar panels as a method of getting electricity, a fairly innovative solution. "We have space and a solar system, we only need the computers" and "An NGO [non-government organization] is assisting our school in getting solar system".

Breakdown and repair of computers was mentioned in 28% of responses. This was clearly stated in the comment "the cost of maintaining it; is nice to have it but its [sic] disgusting to keep it going". Other similar comments included "computers are shutting down – they have exceeded their lifespan – time to get new ones", "virus infecting computers", and "the inconsistency of the system".

Discussion

Educational opportunities in developing countries are important for future development. Economists state that increases in human development, including educational opportunities, lead economic improvement. This suggests that technological advances that advance student educational achievement may have the potential to assist in human capital increases. Thus, the efforts to increase the number of computers in schools could have long-term benefits to the country.

The schools in southern Belize have many challenges in the area of technology. These include problems associated with hardware and software, as well as more basic needs such as electricity. There are many obstacles facing southern Belize schools in terms of integrating technology into instruction.

First, it would seem that the main issue is infrastructure needs. The lack of development in many areas makes many technologies impossible to use within a classroom. Lack of electricity is an obstacle that many villages face. Solar panels can help with getting electricity to the school, but this requires either prohibitive expenses or efforts from a humanitarian group. The lack of electricity is a factor that hinders the uniform use of technology in the schools.

A second challenge is the expense of the equipment. Many of the schools have computers, but these are often used ones that were donated. They were functional when first introduced to the school but quickly quit working. Schools have few funds, so purchasing new computers is not an option. This is also true of useful software. Any programs that may help with educational experiences needs to already be on a working computer; software is too expensive to add

experienced needs to already be on a working computer, software is too expensive to add.

The expense of the equipment is also related to the inability to fix broken computers. There are some individuals in the area that can fix some computer problems, but many of the repairs need parts that cannot be afforded. Some training in computer repair may help keep a few more devices running, but the lack of funds will continue to be a problem.

Controlling the environment within a computer room will assist in increasing the longevity of the computers. The temperature and humidity of the region increases the likelihood of technology breakdown. Air conditioning is scarce, but computers will not last long without a window unit. Several schools have air conditioner window units, but these have the same problems as any other technology. They are expensive and difficult to maintain.

There is an indication from this study that even when technology is available it is infrequently used, indicating that perhaps teachers lack the training necessary to effectively integrate technology into instruction. Teachers who lack confidence in their ability to use computers will be resistant to use them within the classroom. Teacher training in this area is often seen as secondary to getting the hardware, but without it there will be problems with effective integration.

Improving upon computer use in the Toledo district of Belize requires a systemic plan that addresses these challenges. This plan needs to ensure capital support for hardware, software, and peripheral expenses such as air conditioning. The Belizean government does not have the funds to guarantee assistance; thus, the practical approach would include a non-governmental organization that provides financial support as a part of the plan.

The support for capital expenses is a start, but continued use of the computers requires that someone at the schools, or at least within the villages, be trained in repair. The repair training should address basic debugging, as well as using older computers for parts to fix more functional ones. Computers will quickly become trash without someone at the local level who can provide repair services.

These repair services do not have to come from a school teacher, but all teachers must be trained in methods of incorporating the computers/software available into effective learning opportunities for students. Teachers who do not have an adequate understanding of classroom uses of the computers are unlikely to use them. Regular professional development opportunities for teachers to increase their skills in this area, as well as a supportive principal that encourages risk taking, are important for the strategic plan.

Computer use in developing countries may be important in creating learning opportunities that lead to increased education. Schools that want their students to have a global understanding can use technology to present information that they would not otherwise have. In addition, knowledge of basic technology is getting to be important economically, even in developing countries. Preparing students for future endeavors needs to include these skills.

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Table 1

Percentage of Principals who Rated each Area of Computer Technology Problems as "Not a Problem", "Minor Problem", or "Major Problem"

Problem	Respondents	"Not a Problem"	"Minor Problem"	"Major Problem"
Lack of trained teachers	33	3%	52%	45%
Lack of computer hardware	33	3%	18%	79%
Lack of computer software	34	3%	29%	68%
Out of date equipment	29	7%	21%	72%
Computer breakdown	31	10%	16%	74%
Cost of supplies	34	3%	9%	88%
Inadequate space	32	25%	13%	62%

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