Poverty and the Digital Divide in Developing Nations

Methaporn Anuyahong Schneider[1] & Scott B. Droege[2]

[1] Faculty of Management Science, Suan Dusit Rajabhat University, 295 Rajasrima Road, Dusit, Bangkok, Kingdom of Thailand

[2] College of Business and Entrepreneurship, Department of Management and Marketing, Fort Hays State University, 600 Park Street, Hays, KS, U.S.A.

Correspondence: Scott B. Droege, Sias International University, School of International Education, Peter Hall C-107, 168 Renmin Road East, Xinzheng, Henan Province, P.R. China 451150. E-mail: sbdroege@fhsu.edu

Received: April 26, 2014 Accepted: May 13, 2014 Online Published: June 4, 2014

doi:10.5430/sass.v1n2p33 URL: http://dx.doi.org/10.5430/sass.v1n2p33

Abstract

Is there a digital divide between students living in poverty in developed and developing nations with respect to readiness for online learning? This study examines three components of online learning readiness including psychological, technological, and overall readiness for learning. We find that students living in poverty in the developing nation of Thailand were less equipped for online learning than students living in poverty in the developed nation of the U.S.A. This differential readiness is indicative of the developed-developing world digital divide. We provide practical suggestions for narrowing this digital divide.

Keywords: Thailand, developing nation, online learning readiness, poverty

1. Introduction

As a modern means of delivering education, online learning has become widely accepted as it has evolved on the bedrock of three extensively diffused modern developments. These developments are the democratization of education, the fostering of liberal education, and educational quality assessment (Larreamendy-Jones & Leinhart, 2006). Traditional modalities with traditional "face-to-face" orientations have been extended to allow wider access to educational opportunities (Murphy, Anzalone, Bosch, & Moulton, 2002) making online learning a basic component in the fabric of academia (Economic Intelligence Unit, 2008).

However, other factors may impact differential student readiness for online learning in both developing and developed nations. Differential readiness has important consequences not only for students, but also for the economic growth of nations relying on educated workforces to stimulate growth. Poverty among potential students may have an impact on students' readiness for online learning and, by extension, the longer term growth of developing nations. Therefore, this research explores differences in online learning readiness between poverty-stricken students in developing and developed nations.

Nine of the twenty most populous countries are developing nations while only three of the twenty most populous countries are developed nations. One can infer from these figures that there is a high potential for online learning programs that may not necessarily match developing nation online infrastructure. This creates a dilemma in which online education increasingly involves access to technology while developing nations' potential student populous may have the readiness to successfully engage in online learning. Block (2010) and Choy (2000) suggest that the divide between technology haves and have-nots can substantially impede developing nation students as well as those in very rural areas within developed nations to complete their university education. However, research comparing student levels of online learning readiness in developed and developing nations is scarce especially when income status is taken into account. The ubiquity and seeming geographic boundarylessness of internet technology in both developed and developing nations might lead universities to implicitly assume there is little difference between developed and developing nation students in terms of readiness for online learning. Perhaps this is a valid assumption when students have similar technological capabilities combined with the motivation and psychological maturity for self-directed learning.

However, this assumption may be less valid when considering subgroups in developed and developing nations. Particular differences may lie in psychological, technological, and overall learning readiness when students face the additional challenge of low incomes despite the ubiquity of internet technology. Consequently, poverty-stricken students in both developed and developing nations face challenges but developing nation students have the added burden of lack of technological infrastructure that would otherwise allow more widespread internet access in their homes. Further, such developing nation students may not have developed the psychological and technological background required of online learners due to lack of fulltime access to technology that higher income students typically possess. For instance, many poverty-stricken developing nation students conduct most of their class work in crowded internet cafés rather than the relative quiet of home internet access often enjoyed by developed nation students.

This combination of reduced psychological and technological readiness may affect overall online learning readiness. Differential technology infrastructure development may preclude those in developing nations from gaining needed experience in internet technology compared to students in more developed nations. With this in mind, our specific research question asks: Is there a digital divide between poverty-stricken students in developed and developing nations with respect to psychological, technological, and overall online learning readiness? This research question is aimed specifically at online education in which 80% or more of instruction is conducted online as compared to web enhanced or hybrid models of online education (Allen & Seaman, 2007).

Online learning readiness places the onus of learning on the individual. The role of academic institutions is to provide instructional content or learning experiences delivered or enabled by electronic technology that enable individuals to engage in the learning process. Thus, to utilize online learning students need not only to be well prepared to deal with electronic infrastructure such as internet and multimedia technology, but also be self-directed to take advantage of technology-delivered content and learning experiences offered by academic institutions.

We begin to investigate this research inquiry by comparing developed and developing nations differential access to internet infrastructure and reviewing the literature salient to the research question. Second, the research methodology and hypotheses are deduced from this review. Third, the statistical processes and results are presented. Finally, discussion and implications for the future of online learning readiness of poverty-stricken students in developing countries are discussed and specific actions are recommended.

2. Overview of Online Learning

Online learning offers educational opportunities to those hampered by scheduling and geographic impediments (Anderson, 2004). We therefore define online learning as an education modality in which students and professors correspond but with little or no face-to-face interaction. Note that the term “learning” is used for convenience and does not necessarily imply that transfer of inquiry or discovery took place. Similarly, online education readiness describes the knowledge, skills, and abilities as well as access to sufficiently reliable technology that allows online learning to take place. Thus, online learning and online learning readiness suggest that the structural components are in place for learning whether or not learning actually occurs.

The degree of actual learning is dependent on a host of factors other than the structural components that provide the conditions for learning (Beard, Wilson, & McCarter, 2007; Garrison & Anderson, 2003). Three of these factors are germane to this study and include psychological readiness, technological readiness, and online readiness for online learning. Briefly, construct definitions for each of these is as follows. Psychological readiness describes the self-management, motivation, and confidence to pursue online learning in the absence of direct face-to-face contact with an instructor or peer group. For example, a psychologically ready student has the self-assuredness and drive to pursue online learning despite the lack of direct contact with others. Technological readiness describes the comfort level with online learning tools necessary to interact in an online environment. For example, a technologically ready student has enough familiarity with online environments that an online user interface does not present an obstacle to course participation and achievement. Overall readiness describes the set of knowledge, skills, and abilities that promote active engagement with course content in an online context. This is composed of a mix of both psychological and technological variables. For example, a student with overall readiness for online learning views the online learning context as simply a tool for learning rather than an obstacle to learning. Students with prior experiences tend to be more prepared psychologically in that they have the confidence and motivation for online study. When combined with technological experience, or adequate familiarity of online environments, these students tend to have increased overall readiness for online learning readiness. That is, overall online learning readiness is a composite of psychological and technological readiness (McVay, 2000).

We use a modified version of McVay's (2000) survey that assesses psychological readiness and technological readiness. Overall readiness for online learning is a composite of these two constructs. We extend this basic model in our research design by considering whether geographic location (developed or developing market) influences the degree of development of all three of these constructs. Smith (2005) points out that online learning occurs across geographical boundaries, presumably making online learning geographically boundaryless. In addition, online learning has become an essential feature of the outreach mission of a number of departments at colleges and on university campuses as universities attempt to tap into student markets across the globe.

Allen and Seaman (2007) report that in the United States alone growth in online enrollment is over six times growth in total student enrollment. Despite this growth in overall U.S. online course enrollment, Cedja (2007) has pointed out that the disparity in internet connections between rural, urban, and suburban areas is important to address as the use of web-based multimedia technologies in distance education continues to increase. Internet reliability in these areas is important to the distance education population; students may become frustrated when they set aside time to complete online assignments only to find that the internet connection is temporarily down. In addition, Scarafiotti and Cleveland-Innes (2006) report that low income ethnic populations in the U.S.A. are among the fastest growing population segments of students. These students are more likely to fail to finish their chosen degree than non-low income, non-ethnic populations. Also, as the internet provides students with access to global educational opportunities, the potential for serving foreign students increases. Fully one-half of the world's university students reside in developing nations (Scarafiotti & Cleveland-Innes, 2006). Among corporate online education learners, Dublin and Cross (2003) note that 68% of workers of all social strata among 40 global companies would not voluntarily sign up for elective online courses while 31% even failed to register for compulsory online courses. Moreover, among corporate employees who begin a corporate-sponsored online course, between 50 and 80 percent never finish the course.

These types of problems become especially troublesome when working with online programs in developing nations particularly for students who live in provincial areas without close proximity to larger towns or cities having reliable internet access. Institutions offering online courses may unintentionally overlook such problems, instead viewing online learning as geographically boundless while intending to create anytime, anywhere access. However, this occurs only if students are ready for online learning; that is, they have the psychological maturity and technological experience required to be successful in an online learning environment and the infrastructure needed is present.

2.1 The Digital Divide

Our review of the literature revealed that, as far as we are aware, no research has specifically studied access to online learning readiness among low-income students. Also, there are no studies to our knowledge that compare low-income students' online learning readiness across both developed and developing nations. There is, however, research concerning the access of low-income students to online learning in general. Although our study will add to this, it is helpful to briefly review what has already been done in this domain.

When considering readiness for online learning, differences begin to surface particularly in terms of related skills (especially those of a self-directive nature) and basic familiarity with technology. In the brief discussion that follows, the digital divide (Mossberger, Tolbert & Stansbury, 2003) is discussed in terms of unequal access to technology and how this affects online learning readiness. At its core, Block (2010) defined the digital divide as differential technology access based on race, gender, or socioeconomic status. When considering socioeconomic status, the digital divide includes those with adequate access to digital and information technology compared with those with limited access. In terms of developed versus developing nations, the digital divide further sheds light on differences between developed nation online learners typically having continuous internet access and developing nation online learners who frequently have only limited access. It is thus a mistaken supposition by academic institutions to assume online learning provides 24-hour, always on access. Even when internet connections are stable in developing nations, learners who do not have internet connections in their homes are limited by internet café hours of operation, a condition not typically encountered by developed nation online learners.

Access to technology is often defined by what students do not have and represent a barrier for online learners; however, the digital divide goes deeper than this. The digital divide originates with more socially complex factors such as race, income, location (urban/suburban versus rural areas), and other demographic characteristics. Warschauer (1999) stresses the importance of electronic literacy in contemporary society, while Mossberger, Tolbert, and Stansbury (2003) note that the lack of fundamental technology-related skills such as e-mail, locating information on the web, and using word processing and spreadsheet programs indicate the need for policy attention to these issues in early grades to prepare for high school and college.

Still, technology is not the only limiting factor involved with readiness for overall online learning readiness; psychological preparation may be just as large a hurdle. While the importance of social class and ethnicity may determine online learning access, all novice internet users irrespective of social class and ethnicity face psychological barriers when initially introduced to the internet. Academic institutions assuming that all students who enroll for an online course have the prerequisite propensity to and preparedness to succeed may find that students with little background in self-study and technology utilization face the dual challenges of both psychological and technological unpreparedness. Online learners who are less comfortable and less satisfied with their internet usage skills are more likely to encounter stress-inducing problem situations, experience uncertainty about how to get started, and tend to have the perception that computers are overly complicated. If online learning is the phenomenon that brings the possibility of "anywhere anytime" to the term "learning," the term "digital divide" designates the barrier to this possibility being actualized. The digital divide can thus be defined in terms of unequal access to information technology, the ability to use information technology, and not having the requisite psychological and technological understanding, adaptability and capacity to use such technology. Bridging the digital divide would potentially increase access to those in developing nations who have less confidence in their online learning abilities (lower psychological readiness) as well as less technological experience (lower technological readiness).

Quantitative measurement of the digital divide is also possible if we consider strictly the number of households having internet households as a percentage of the total number of households in a nation. Clearly, this ignores the wider social influences on internet usage we have previous noted as partially responsible for the digital divide. However, such a measurement does provide an approximation of the digital divide with respect to households having internet connections and therefore being more likely to have always on internet access (barring service interruptions). For example, the United Nations has long classified Thailand as a developing nation while classifying the U.S.A. as a developed nation. The International Telecommunication Union (2013) uses these U.N. classification categories in its measurement of global internet users. The digital divide as far as home access can be approximated using such data. The International Telecommunication Union (2013) estimates that approximately 78% of developed nation households have internet access while this estimate drops to 28% for developing nations such as Thailand. This gap between developed and developing nations is indicative of the worldwide digital divide with respect to the potential for always on internet access. What is especially striking is that the digital divide has expanded rather than contracted during the previous 11 years during which such data are available. In 2002, approximately 35% of developed nation households had internet access while this rate in developed nations was roughly 4%, resulting in a household internet access digital divide of 31% in 2002. However, the digital divide has risen from 31% in 2002 to nearly 50% in 2014.

2.2 Poverty and the Digital Divide

To understand the relationship between poverty and the digital divide, we must define what we mean by poverty-stricken students. For our research, we define poverty-stricken students as low-income students in two groups; the first group is composed of higher education students in the U.S.A. and the second group in Thailand. Clearly, there is not a one-to-one correspondence between low incomes in the U.S.A. and low incomes in Thailand. This is because purchasing power parity varies vastly between developed and developing nations. We attempt to clarify this problem in the following sections. Still, national poverty guidelines and measures such as the GINI index attempt to adjust for these discrepancies. Even though such measures lack perfect one-to-one correspondence, they are still useful in understanding social strata classifications. We therefore took pains to come as close as possible to accurately defining poverty-stricken students to allow for comparison. We took into consideration telephone lines per 100 people and the percentage of gross domestic product (GDP) spent by government on infrastructure considering the base rate of overall GDP (Dada, 2006). Several online learning readiness indicators are predictors of actual e-business activity including internet and computer infrastructure, affordable telephone service, literacy rates, English language capabilities, and logistics infrastructure (Economic Intelligence Unit, 2009; Gregorio, Kassicieh, & De Gouvea Neto, 2005). The next two sections explain how we defined low-income students in the U.S.A. and Thailand.

2.3 Defining Poverty-Stricken Students in Developed and Developing Nations

This section defines poverty-stricken students in the developed nation of the U.S.A. and the developing nation of Thailand that we subsequently use in our methodology in terms of sample selection.

Poverty-stricken students, referred to as low-income students by many U.S.A. educational statistics agencies, are defined as those whose family income was below 125 percent of the federally established poverty level for their family size (National Center for Education Statistics, 2000). Another way of saying this is that a low-income student is one whose family's taxable income for the preceding year did not exceed 150 percent of the poverty level amount.

This definition has several advantages. First, it is independent of who goes to college, meaning that students meeting this criterion are poor relative to the general population, not just relative to other college students. Second, because the poverty levels are stated in terms of both income and family size, comparisons among students in different family sizes are appropriate. Finally, the poverty levels are updated annually and adjusted for inflation, allowing meaningful comparisons over time.

We use the U.S. poverty level guidelines developed by the U.S. Department of Health and Human Service as our measure of poverty in the U.S.A. These sources derive their definition of low-income students from data collated by the U.S. Department of Education at the National Center for Education Statistics. Hence, the term "U.S. low-income student" shall be defined as those whose income is below the low-income values currently provided by these government agencies.

In Thailand, a low-income student is defined as an individual whose family income was below 200,000 Thai baht per annum, which translates into approximately $6,200 USD per annum. Hence, the term Thai low-income student shall be defined accordingly.

2.4 Online Learning Readiness

Multiple measures have been suggested relative to online learning readiness (Aydin & Tasci, 2005); however, our focus is on online learning readiness in developed and developing nations among poverty-stricken students. It is evident that online learning technology in developing nations can result in a more educated workforce as education spreads over a wider population. While helpful, this still does not explore potential differences between low-income students in developed and developing nations in regard to students' readiness to use such technology. Such readiness, however, is an important consideration for developing nations embarking on the path toward the infrastructure build-up necessary to utilize and sustain online learning initiatives. This reflects the genuine need for balance for developing nation institutions seeking the most effective trade-offs between preparing students for technology while also making strides toward implementing technology. Issues of costs in terms of spending on technology must be balanced against the social and economic benefits of developing nation online learning that result from a more literate and knowledgeable workforce.

The following section delineates specific hypotheses based on the previous literature and guides the remainder of this research.

2.5 Hypotheses

H1: Poverty-stricken students in developing nations have lower technological readiness for online course performance compared to poverty-stricken students in developed nations.

H2: Poverty-stricken students in developing nations have lower psychological readiness for online course performance compared to poverty-stricken students in developed nations.

H3: Poverty-stricken students in developing nations have lower overall online learning readiness compared to poverty-stricken students in developed nations.

3. Methods

Data were collected using a using a 57-item survey. This is a modification of McVay's (2000) and Smith's (2005) original 53-items. The additional items allowed for collection of demographic data. The survey was provided in English for students in the U.S.A. and in Thai for students in Thailand. We utilized modified double-back translation to ensure measurement equivalence between the English and Thai survey items. Double-back translation involves native speakers in both English and Thai who verified first round translations. In the second round, a third expert fluent in both Thai and English served as mediator between round one translators to remedy differences. This provided measurement equivalence when administering the survey in two languages (Brislin, 1970; Riordan & Vandenberg, 1994).

McVay's (2000) scale deals primarily with technological readiness while Smith (2005) taps into psychological readiness. Our additional demographic questions allowed us to differentiate the students in poverty from those who were not in poverty. The demographic data allowed us to segregate the surveys completed by low-income students in both Thailand and the U.S.A. from students who were above the low-income threshold. We included only surveys from low-income students in the data analysis. Both developed and developing nation participants consisted of a variety of educational majors and minors. The total sample size after separating low-income students from the total number surveyed resulted in a sample size of 400 with 129 completed surveys from the U.S.A. and 271 from

Thailand.

An American professor administered surveys at one mid-sized U.S. university and several Thai professors administered surveys in multiple universities in Thailand. All students in the classes in which the surveys were distributed completed the surveys. The professors instructed students that the survey was related to online courses but made no mention of low-income students as this may have embarrassed students and biased the results. Instead, after all students completed the survey, the two primary researchers collated the surveys that met our low-income criteria. The demographic questions allowed us to surreptitiously determine whether or not students were below their respective country's poverty level thus establishing our total sample of 400 students.

4. Results

Our aim was to determine whether learning readiness was roughly equivalent or significantly different between the two groups of students who fall below their respective poverty guidelines in a developed (U.S.A.) and developing nation (Thailand) with respect to psychological, technological, and overall readiness for online learning. In other words, we sought to determine whether there was a statistically significant digital divide between poverty-stricken students in these two groups. A significant difference would demonstrate inequality of educational opportunities (Kaur & Abas, 2004) due to insufficient preparation for online course environments.

We first used t-tests to compare each group (poverty-stricken students in the U.S.A. and Thailand) on the first two measures (technological and psychological readiness). We then determined overall learning readiness with a summated measure by using a composite measure of psychological and technological readiness then used a t-test to compare differences in this summated measure. We controlled for gender in each test and found no significant difference between genders ($p < .01$). The following tables show the results of the tests of means in the three variables.

Table 1. T-test for equality of means, psychological readiness by location

	Location	N	Mean	t	p
PsyR_Summscale	Thailand	271	2.5949	–11.460	.000*
	USA	129	3.0549		

Table 1 presents the t-test results of psychological readiness. Table 1shows that psychological readiness between U.S. and Thai poverty-stricken students is significant at $p < .01$.

Table 2. T test for equality of means, technological readiness by location

	Location	N	Mean	t	p
PsyR_Summscale	Thailand	271	.4577	–2.071	.000*
	USA	129	3.0549		

Table 2 presents the t-test results of technological readiness using a summated scale derived from the survey responses. Table 2shows that psychological readiness between U.S. and Thai poverty-stricken students is significant at $p < .01$.

Table 3. T-test for equality of means, overall learning readiness by location

	Location	N	Mean	t	p
PsyR_Summscale	Thailand	271	.4978	–17.840	.000*
	USA	129	.7252		

Table 3 presents the t-test results of overall online readiness using a scale derived from the composite responses of psychological and technological readiness. This variable transformation and is a straightforward process whereby the items comprising the summated scale were summed and averaged. We used this composite scale given that prior research acknowledges overall online readiness is a composite of both psychological and technological online readiness. Such a composite scale is typically used to reduce measurement error by improving individual variables in

which several variables are joined in a composite measure to represent a concept (Hair Jr., Black, Babin, & Anderson, 2010). Table 3 shows that overall online readiness between U.S. and Thai poverty-stricken students is significant at $p < .01$.

5. Discussion and Implications

With the advent of online learning opportunities, the digital divide between developed and developing nations has become increasingly important. Clearly, an educated workforce is a prerequisite for developing nations to emerge into developed nations. Online learning can be one avenue by which this occurs. We begin this section with a brief overview of the three hypotheses as stated in section 2.5 and analyzed in section 4. We then provide five recommendations to increase the potential for developing nation growth through a more educated workforce. These recommendations include problem-based learning, allocating government resources in developing nations to online learning curricula development, government and local educational system partnerships in developing nations, technological training for teachers, and encouragement of involvement of the family unit in student learning. After briefly revisiting our hypotheses, we elaborate on each of these recommendations.

Hypothesis 1 was statistically significant and states the psychological component of online readiness of low-income students' in developed nations is higher than those in developing nations. This emphasizes the emotional perspective of students toward online learning in addition to their self-confidence in completing online study. Learning in any form, whether online, blended, or face-to-face, is enhanced when students are emotionally anchored in course content and confident they can succeed.

This is closely related to hypothesis 2, which was also significant and states that the technological component of online readiness of low-income students in developed nations is higher than in developing nations. Potential students who would normally embrace course content may view it adversely if the technology accompanying the content is beyond the students' capabilities or if the technological infrastructure needed for course completion is inadequate, inconvenient, or in some cases completely absent.

Hypothesis 3 was also significant and states that the overall online learning readiness of low-income students in developed nations is higher than in developing nations. This is a broad but important measure. As we stated at the beginning of this discussion, a developing nation's potential for development is at least in part dependent on an educated workforce. However, in many developing nations, internet access is completely unavailable in rural areas. Even in less rural areas, internet access in homes should not be taken for granted among families living in poverty. On the upside, even smaller towns and villages in developing nations often have "internet cafés." An internet café is characteristically a fairly small room with multiple broadband equipped computers. These rudimentary cafés usually have small desks side by side to squeeze in as many computers as possible in efforts to maximize revenue through high capacity utilization during hours of operation. Wi-Fi hotspots can be few and far between in rural parts of developing nations. In addition, even the modest cost of internet cafés in more urban developing nation locations can be prohibitively expensive for students living in poverty. For instance, given the choice between having enough money for food or having enough money to pay for internet café time can factor into a student's psychological readiness for online learning. This digital divide of online students in developed and developing nations can have an economic impact on developing nations unless these nations can find a solution to extend education to those in poverty.

We would like to offer suggestions to help close the developed-developing nation digital divide. First, problem-based learning initiatives in primary and secondary schools rather than rote learning may improve developing nation students' psychological readiness for online learning at the university level. Fenwick (2010) found that graduate students exposed to large amounts of problem-based learning experienced increased understanding of multiple perspectives, increased cooperation and leadership of small groups, successfully managed conflict, increased self-awareness, enhanced self-confidence, and were more likely to use systems rather than silo thinking. However, emphasizing problem-based learning in students' formative years can yield long-term benefits. A meta-analysis by Dochy, Segers, Van de Bossche, and Gijbels (2003) revealed that both knowledge and skills are positively impacted by problem-based learning; as students advance in their education, problem-based learning continues to have positive psychological effects even years later. Developing nation educational agencies could emphasize problem-based learning early in students' education to begin closing the digital divide.

Furthermore, Hsu and Shiue (2005) point out that self-directed learning, a component of problem-based learning, increases motivation for learning. This is directly related to our hypotheses. Self-directed students must develop

psychological readiness to build the confidence and diligence required for online learning. Technological readiness suggests that skills and abilities match online course delivery systems. Overall engagement suggests that students have chosen knowledge areas for greater pursuit coinciding with our third hypothesis that stated poverty-stricken students in developing nations have lower overall online learning readiness compared to those in developed nations. Greater emphasis on self-directed learning may increase the likelihood that students will complete online courses successfully.

Second, developing nation governments could follow the advice of McCombs and Whisler (1997) by encouraging primary and secondary schools to focus on students' motivation, learning, and achievement as opposed to memorization of facts. This allows students to develop both critical thinking as well as the confidence to inspire psychological readiness needed to succeed in online learning environments. This can be partially accomplished by taking into consideration students' experiences, perspectives, backgrounds, talents, interests, capacities, and needs. In addition, McCombs and Whisler (1997) suggest that governments in developing nations should encourage university scholars to take on academic investigation and subsequent implementation of best learning practices. Thus, governments in developing nations could play a positive role in creating a more knowledgeable populace through applied research in educational methodologies promoting psychological and technological learning readiness eventually resulting in a more highly skilled workforce and thus higher economic growth.

As far back as 1975, Knowles (1975) suggested seven elements of successful learning: (1) establishing a climate conducive to learning, (2) creating a mechanism for planning, (3) diagnosing the needs for learning, (4) formulating program objectives that will satisfy these needs, (5) designing a pattern of experiences of learning, (6) conducting these experiences of learning using techniques and materials and (7) evaluating learning outcomes diagnosing learning needs. Although Knowles (1975) study was obviously done prior to the widespread availability of internet technology, these seven elements continue to be relevant in contemporary education as well as in online learning. What is important to note here is the emphasis on experience. Experience in various academic pursuits may also develop the confidence associated with psychological development. Such development may transfer to psychological readiness in online learning. Government grants could provide funding to scholars willing to conduct research in each of these areas. Thus, governments can have a quite helpful role in reducing the digital divide by making research into online education a priority with the goal of providing a means to reach beyond geographic boundaries and even into the more rural areas of developing nations.

Third, ministries of education or other such government agencies in developing countries could enhance students' technological readiness by stipulating that technology become part of the compulsory education system at the primary level. Such partnerships have demonstrated the beginning of this process. For example, the Economic Intelligence Unit (2003) has reported on "blended" courses to help students gain such familiarity with technology. Universities have continued to follow this pattern with using "hybrid" courses in which parts of a course are delivered online and other parts are delivered in face-to-face formats. One disadvantage of such blended or hybrid courses are that they are not truly geographically unbounded; rural students in developing nations are typically excluded from the face-to-face portion of such courses due to these students' relative geographic isolation. Allen and Seaman (2013) note that from 30% to 70% of these blended or hybrid courses are delivered face-to-face, raising the digital divide for students unable to travel to a central location; this is particularly onerous for students in developing nations who live in distant rural areas in which travel to more rural areas may be prohibitive. Rather than true online learning, a better term is "Web-assisted" as the amount of course content approaches the higher end of this 30% to 70% range to denote the true nature of the course delivery system.

One way developing countries might partially remedy this problem is to use hybrid, blended, or Web-assisted classes in primary and secondary schools in rural areas to the extent such schools are able given their limited infrastructure. This would provide the beginning of an alternative that could be used to help improve students' technological readiness. Such courses might initially be funded by the developing nation rather than placing the financial burden on individual school districts. This funding shift may have the additional advantage of strengthening partnerships between rural schools and government. Over time, individual schools could design initiatives that are online learning friendly such that technological and psychological online readiness among students becomes the norm, organically reducing the developed-developing nation digital divide.

Fourth, developing nations should not assume that teachers are technologically savvy. Rather, developing nations should provide a technological competency training for primary and secondary school teachers. This would allow teachers to pass this technological readiness on to students in the form of blended, hybrid, or Web-assisted assignments. Students' subsequent technological readiness may increase their comfort and confidence with online

learning and thus their psychological readiness as well.

Fifth, we must consider the influence of the family unit on students' online learning readiness. Typically, the family unit in many developing nations is among the most important social structures due in part to cultural conditioning and lifetime mutual interdependence. One way to involve the family in education is to assign student groups an open-ended community problem (Au, 1998). Allow the student group to develop a research question that must be approved initially by the teacher so that it is in such a form that student groups cannot simply find a simplistic answer but rather encourage students to seek underlying causes for problems (Bowler, Large, & Rejskind, (2001). For instance, teachers could ask students to investigate how to reduce local drinking water mercury contamination. This would involve investigating current mercury factory emissions technology as a baseline then search for communities that have used alternative technologies to solve this problem. Although this does not deal directly with internet technology, it may help reduce the digital divide by training students to inquire about important issues that could truly assist their own communities. At the completion of the project, students' families could be invited to the school to hear their child's technological solution, thus helping to garner ongoing family support related to the benefits of local technology. In addition, knowing that their parents will hear student groups' suggested solutions would likely increase the student groups' pride, and thus psychological readiness, of future, larger projects that involve jointly seeking solutions for community problems.

While typically referred to as service learning (e.g., Stine, Cress, Collier & Reitenauer, 2013; Stoker & Tryon, 2009) this strategy may lead to other benefits such as student inquiry and empowerment and thus an increase in psychological readiness for online learning. The very act of inquiry needed for these types of assignments challenges and builds confidence among students who may lack the confidence and motivation to complete online courses. Furthermore, projects such as this encourage students and teachers to become co-learners (Stewart, Zediker& Witteborn, 2004), furthering skills of both students and teachers. When families become involved in these co-learning experiences, familial support of students learning can substantially transform the learning environment to expand from the classroom, to the community, and to the home. This extension of involvement may improve the psychological readiness students need to success in self-directed learning common in online environments.

6. Conclusions

The developed-developing nation digital divide has ramifications ranging from individual students and their households to development of a skilled workforce. Such a wide-ranging phenomenon is worthy of considerably more study. Our three hypotheses regarding psychological readiness, technological readiness, and overall readiness for online learning in developing nations relative to developed nations has only scratched the surface. However, combined with other literature on the digital divide, this study adds to the mounting evidence that one path toward individual and national growth is through education. Increased access to online learning is but one direction toward this goal but an important one for poverty-stricken students in developing nations and particularly those in very rural areas.

In addressing this need, we have offered five recommendations: problem-based learning, developing nation government involvement with online learning curriculum, developing nation government involvement with school partnerships, technological training for teachers, and involvement of the family unit in student learning. Each of these may lead to development in students' early education of the skills and confidence needed to participate in online learning when these students later engage in higher education. Governments and schools should partner to provide the infrastructure, teacher training, and student participation to develop online learning as a truly ubiquitous technology and thus narrow the current developed-developing nation digital divide.

References

Au, K. H. (1998). Social constructivism and the school literacy learning of students of diverse backgrounds. *Journal of Literacy Research, 30*(2), 297-319.

Allen, I. E., & Seaman, J. (2007). *Online nation: Five years of growth in online learning*. Needham, MA: Sloan Consortium.

Allen, I. E., & Seaman, J. (2013). *Changing course: Ten years of tracking online education in the United States.* Needham, MA: Sloan Consortium.

Anderson, T. (2004). Toward a theory of online learning. In T. Anderson, & F. Elloumi (Eds.), *Theory and Practice*

of Online Learning (pp. 33-60). Athabasca, AB: Athabasca University.

Aydin, C. H., & Tasci, D. (2005). Measuring readiness for e-learning: Reflections from a developing country. *Educational Technology & Society, 8*(4), 244-257.

Beard, C., Wilson, J. P., & McCarter, R. (2007). Towards a theory of e-learning: Experiential e-learning. *Journal of Hospitality, Leisure, Sport and Tourism Education, 6*(2), 113-115.

Block, J. (2010). Distance education and the digital divide: An academic perspective. *Online Journal of Distance Learning Administration, 13*(1), 153-162.

Bowler, L., Large, A., & Rejskind, G. (2001). Primary school students, information literacy, and the Web. *Education for Information, 19*(1), 201-223.

Brislin, R. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology, 1*(3), 186-216.

Cedja, B. D. (2007). Distance education in rural community colleges. *Community College Journal of Research and Practice, 31*(4), 291-303.

Choy, S. P. (2000). Low-income students: Who they are and how they pay for their education. National Center for Education Statistics, Office of Educational Research and Improvement, U.S. Department of Education, Washington, D.C.

Cress, C. M., Collier, P. J., & Reitenauer, V. L. (2013). *Learning through serving: A student guidebook for service-learning and civic engagement across academic disciplines and cultural communities*. Sterling, VA: Stylus Publishing.

Dochy, S., Van de Bossche, M., & Gijbels, D. (2003). Effects of problem-based learning: A meta-analysis. *Learning and Instruction, 13*(5), 533-568.

Dublin, L., & Cross, J. (2003). Implementing e-learning: Getting the most from your e-learning investment. Paper presented at the ASTD International Conference, Washington, D.C.

Economic Intelligence Unit. (2003). The 2003 e-learning readiness rankings: A white paper from the Economist Intelligence Unit. Economic Intelligence Unit and the IBM Institute for Business Value, London.

Economic Intelligence Unit. (2008). The 2008 e-readiness rankings: Maintaining momentum. Economic Intelligence Unit and the IBM Institute for Business Value, London.

Economic Intelligence Unit. (2009). The 2009 e-readiness rankings: The usage imperative. Economic Intelligence Unit and the IBM Institute for Business Value, London.

Fenwick, T. J. (2002). Problem-based learning: Group processes and the mid-professional: Implications for graduate education. *Higher Education Research & Development, 21*(1), 5-21.

Garrison, D. R., & Anderson, T. (2003). *E-Learning in the 21st Century: A Framework for Research and Practice.* London, Routledge.

Gregorio, D. D., Kassicieh, S. K., & De Gouvea Neto, R. (2005). Drivers of e-business activity in developed and developing nations. *IEEE Transactions of Engineering Management, 52*(2), 155-166.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis: A Global Perspective* (7th Ed.), Upper Saddle River, NJ: Pearson.

Hsu, Y. C., & Shiue, Y. M. (2005). The effect of self-directed learning readiness on achievement comparing face-to-face and two-way distance learning instruction. *International Journal of Instructional Media, 32*(2), 143-155.

International Telecommunication Union. (2013). *Percentage of households with Internet access by level of development* (17th Ed.), World Telecommunication/ICT Indicators Database.

Kaur, K., & Abas, Z. (2004). An assessment of e-learning readiness at the Open University Malaysia. Paper presented at the International Conference on Computers in Education. Melbourne, Australia: McConnell International LLC.

Knowles, M. S. (1975). *Self-directed learning: A guide for learners and teachers*. Englewood Cliffs, NJ: Prentice-Hall.

Krauss, J., & Boss, S. (2013). *Thinking through project-based learning: Guiding deeper inquiry.* Thousand Oaks, CA. Corwin: A Sage Company.

Larreamendy-Joerns, J., & Leinhart, G. (2006). Going the distance with online education. *Review of Educational Research, 76*(4), 567-605.

Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion and motivation. *Psychology Review, 98*, 224-253.

McCombs, B. L., & Whisler, J. S. (1997). *The learner-centered classroom and school.* San Francisco: Jossey-Bass.

McVay, M. (2000). *How to be a successful distance learning student: Learning on the internet.* Boston: PearsonCustom.

Mossberger, K., Tolbert, C. J., & Stansbury, M. (2003). *Virtual inequality: Beyond the digital divide*. Washington, DC: Georgetown University Press.

Murphy, P., Anzalone, S., Bosch, A., & Moulton, J. (2002). *Enhancing Learning Opportunities in Africa: Distance Education and Information and Communication Technologies for Learning.* Washington, DC: Human Development Department.

Riordan, C. M., & Vandenberg, R. J. (1994). A central question in cross-cultural research: Do employees of different cultures interpret work-related measures in an equivalent manner? *Journal of Management, 20*(3), 643-671.

Scarafiotti, C., & Cleveland-Innes, M. (2006). The times they are a-changing. *Journal of Asynchronous Learning Networks, 10*(2), 33-44.

Smith, P. J. (2005). Learning preferences and readiness for online learning. *Educational Psychology, 25*(1), 3-12.

Stewart, J., Zediker, K.E. & Witteborn, S. (2004). *Together communicating interpersonally: A social construction approach* (6th ed.), Oxford: Oxford University Press.

Stoker, R., & Tryon, E.A. (2009). *The unheard voices: Community organizations and service learning.* Philadelphia: Temple University Press.

Warschauer, M. (1999). *Electronic literacies: Language, culture, and power in online education*. Mahwah, NJ: L. Erlbaum Associates.