

Student Internet Use: USA and Mauritius

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The New Partnership for Africa's Development (Nepad) identified information technology as one of the core areas for concern in promoting sustainable growth and development. The Internet is a potentially powerful tool for narrowing the poverty gap and eliminating geographic barriers to the acquisition of wealth. However, Africa's lack of Internet connectivity puts it at a distinct disadvantage with regard to participation in the global economy (Mbarika, Jensen, & Meso, 2002). Of the world's major regions, Africa has the least Internet penetration at 1.4% of the population (Internet Usage Statistics B The Big Picture, 2004). Barriers to Internet use include irregular or nonexistent electricity supplies, inadequate telephone networks, and shortages of trained people (Darley, 2003; Mbarika et al, 2002).

Mauritius, a small island nation off the coast of East Africa, is attempting to take a leadership role in the introduction of the Internet and information technology to Africa (Ackbarally, 2002). This goal might be attainable because the country has a stable annual economic growth rate of over five percent, the highest per capita income in Africa, and electricity and telephone connection in a majority of the households. According to the country's National Computer Board (National Computer Board, 2003), 23.8% of the households with telephone connectivity also have Internet access. Overall current Internet penetration is 11.9% (Internet Usage Statistics for Africa, 2004). While this figure is high for Africa, it is well behind developed countries such as Sweden (74.6%), Hong Kong (72.5%), and the United States (69%).

Mauritius has a widely recognized need for training in IT and Internet use (Robinson, 2002). The Leland Initiative of USAID identified several barriers to Internet use in Sub-Saharan Africa, one of which was a lack of Internet training. Ackbarally (2002, p. 161)

quoted the finance ministry's warning that Although Mauritius has attained a high literacy rate, the quality of its labour force falls far short of what is needed for the country to move onto a higher plane of development. To harness the potential of electronic commerce, Kardaras and Karakostas (2001) recommended employee training. Historically, the proportion of university students in Mauritius majoring in technical subjects has been small relative to the population size, and teacher quality and educational resources often poor (Wignaraja, 2002).

The Mauritius National Computer Board adopted a pro-active strategy in response to these needs (National Computer Board, 2003). IT vans equipped with computers have delivered courses to over 19,000 residents. Long-term attention has been devoted to the development and use of IT at the University of Mauritius (Rodrigues & Govinda, 2003).

In technologically developed countries, such as the U.S., use of the Internet appears pervasive in higher education. Results of a PEW survey revealed the extensive role of the Internet on college campuses (Jones, 2002). The report concluded that, AToday's [U.S.] college student will be well prepared to work in a wired world@ (p. 19). Given the need for Internet training in Mauritius, what is the current state of this form of education among post-secondary students? How much do they use the Internet and for what purposes? Do they receive training in Internet use? How does this compare with U.S. students, if as Jones (2002) contended, they are indeed well prepared to work in the high-tech economy? And finally, what lessons can other nations of Sub Saharan Africa draw from the experience in Mauritius?

Purpose of the present study

The purpose of the present study is to explore student Internet use in Mauritius. The same types of data were collected at a university in the United States for comparison purposes. Results of the present study might serve as a basis for (a) benchmarking educational efforts regarding Internet use and also for (b) generating hypotheses concerning curriculum development for educational institutions based in cultures with relatively low Internet exposure such as that found in Mauritius and elsewhere in Africa. Incorporation of the Internet into educational experiences would seem to be a critical requirement for preparing workers in any part of the world for participation in the global information economy.

Method

Samples

Mauritius. Ninety-three undergraduate students from a major university in Mauritius took part in the study. All were Internet users. The sample included 36 men and 57 women. Average age was 26.45 years. Ninety-seven percent of the sample was majoring in business. The following majors comprised the remaining three percent of the sample: arts, hospitality/tourism, and engineering.

U.S.A. The data collection site was a medium sized university in the southern part of the country. One hundred forty-nine undergraduates who were Internet users participated. The sample composition was 82 men and 67 women. Average age was 22.56 years. Ninety-two percent of the sample majored in business. The remaining participants reported a variety of majors including elementary education, fashion merchandising, math, journalism, English, and political science.

Procedure

Data was collected via questionnaires that were administered to students enrolled in business classes. Participation was voluntary and confidential. Researchers entered classrooms and requested study participation. Students were offered extra credit points for completing the questionnaire. English was the medium of instruction at both institutions involved in the data collection. However in Mauritius, the questionnaire administrators were fluent in Hindi and French as well as English so that they could effectively answer any questions that might arise. Language did not appear to be a problem for the respondents.

Measures.

Internet Use. Daily hours of Internet use were measured with an open-ended response format. Specifically, respondents were asked: AApproximately how many hours per day do you spend on the Internet for: Coursework use?____ Personal use?____.@ Frequency of Internet usage was operationalized with the one-item scale developed by Davis (1989, p. 329), modified so that the focus was on the Internet. Six-position categorical boxes were labeled ADon't use at all,@ AUse less than once each week,@ AUse several times a week,@ AUse about once each day,@ and AUse several times each day.@

Types and extent of Internet experiences were measured with a scale adapted from Anandarajan, Simmers, and Igbaria (2000). Various types of Internet activities were listed and respondents were asked to rate their experience on a five-point scale ranging from Anone@ to Avery extensive.@ An item from the original scale concerning programming in hypertext-based software was not used in the present study. This is because most web page creation and maintenance is now performed using software specifically designed for those purposes rather than for programming in HTML. Three additional items were added to the scale to reflect other widespread current purposes for Internet use. These items pertained to e-mail, reading news, and purchasing products over the Internet. The complete scale is presented in Appendix 1.

Other Measures. Attitude toward Internet use was operationalized with the 4-item technology affective scale reported by Taylor and Todd (1995). The wording of the items was modified to reflect Internet usage. Respondents were asked whether using the Internet was bad/good, foolish/wise, whether they disliked/liked using the Internet, and whether it was unpleasant/pleasant. The previous authors demonstrated acceptable psychometric properties for the scale. Items are presented in Appendix 1.

Extent and sources of Internet training were measured with an adaptation of the computer training measures used by Anankewe, Igbaria, and Anandarjan (2000). Participants were asked to indicate the level of training they had received from two sources: university courses and self-training. A five-point response scale ranged from Anone@ to Aextremely extensive.@ Again, wording was changed from Acomputer@ to AInternet.@ Two additional items used by the previous authors concerned training by vendors and in-house training. These were not employed in the present study because the subject population was university students rather than employees.

Results

The attitude scale was expected to exhibit internal consistency. Cronbach's alpha was .81 and .79 respectively for the U.S. and Mauritius samples. Because the value was over or near .8, the scale appears to have acceptable reliability for both samples.

Internet Use.

The overall findings indicated that the U.S. sample reported more of every type of Internet use. Results of t-tests of differences between the means were statistically significant in each case. Frequency of use appeared to be about once a day versus only several times a week for the U.S. and Mauritius samples, respectively ($t = -9.41, p < .0001$). Daily hours of use for both coursework and personal use are double the Mauritius level for the U.S. participants (coursework hours sample means = 1.76 for U.S. and 0.91 for Mauritius, $t = -5.77, p < .0001$; personal hours sample means = 2.08 for U.S. and 0.84 for Mauritius, $t = -6.07, p < .0001$).

The extent of Internet experience for each of several types of activities was also greater for the U.S. students as shown by t-test results displayed in Table 1.

Table 1
Means for Internet Experience for USA and Mauritius

	<u>USA</u>	<u>Mauritius</u>	<u>T-test</u>
E-mail	3.155	2.6	-3.89*
Accessing Internet	3.121	2.226	-7.15*
Using Search Engines	3.081	1.925	-8.31*
Downloading Files	2.723	2.011	-4.97*
Reading News/Information	2.615	1.559	-7.65*
Online Purchasing	1.831	0.183	-13.01*
Creating Web Pages	1.203	0.237	-8.08*
Maintaining Web Pages	0.905	0.215	-5.97*
* = p<.0001			

Training.

Results suggest that the U.S. students received more training in Internet use from the university than did those in Mauritius (sample means = 3.03 for U.S. and 1.05 for Mauritius, $t = -7.11$, $p < .0001$). They also reported more self-training (sample means = 3.17 for U.S. and 2.29 for Mauritius, $t = -5.53$).

Attitude.

Attitude toward Internet use was the only variable for which no significant difference was detected between the sample means. The score could range from zero, representing a poor attitude, to a maximum of 24 on the good attitude end of the scale. Both means were slightly over 20, indicating that students in both countries appeared to have a positive affective orientation toward Internet use.

Discussion

In spite of the country's recent efforts in the area of technology education, the present results suggest that university

students' Internet use in Mauritius is still less than that in the U.S. Because universities can play a key role in the transfer of new technology, it seems essential that university training be on par with developed countries so that the business and technology sectors of Mauritius will have the necessary knowledge resources to participate in the global economy.

The present study's data suggests that students in the Mauritius and USA samples appeared to have equally positive attitudes toward using the Internet. Thus, attitudinal factors are not likely to be a barrier in the extent of students' Internet usage. Previous literature has shown attitude to be an important factor in technology acceptance and use (Mahmood, Hall, and Swanberg, 2001; Taylor & Todd, 1995).

However, the sample of Mauritius students reported that they were receiving less university sponsored and self training than the U.S. sample. On the basis of the results of their meta-analysis, Mahmood et al. (2001) identified training as having an important effect on technology use. Anandarajan et al. (2000) found that web skill correlated positively with time and frequency of Internet use for working MBA students. Training may furthermore build feelings of self-efficacy or confidence in Internet use. The popular and widely applied technology acceptance model was reportedly effective in predicting students' World Wide Web use only when a computer self-efficacy component was added to the model (Fenech, 1998). Thus a foundation of training appears critical in promoting Internet usage.

Mauritius has the potential to help lead Southern Africa into the communication age. An undersea fiber optic cable surrounding Western and Southern Africa is ready for connecting the continent to the Internet. However, many countries that have access to the cable are not making use of it (Goldstein, 2004). Because Mauritius has developed its communications infrastructure to a greater degree than many other coastal African countries, it is positioned to better utilize this resource. It has developed a Cyber city and IT park to foster IT industry growth (Boyle, 2004; Cybercity Mauritius, 2004).

On the basis of data collected from an African sample, Hasan and Ditsa (1999) surmised that the region is culturally receptive to the adoption of IT. In support of this notion, Africa now has the highest Internet user growth rate in the world: 183.2% for the period

2000-2004 (Internet Usage Statistics B The Big Picture, 2004). Hasan and Ditsa argue that it is critical to tailor technology development in less developed countries to their culture, history, and industrial traditions. Being part of African culture, Mauritius therefore may be more effective than foreign agents in introducing its neighbors to widespread Internet use.

Recent Africa-specific conferences on education have repeatedly identified inter-African cooperation and innovative use of ICT as goals for universities (Seddoh, 2003). In order to bridge the digital divide, Polikanov and Abramova (2003) contended that African states must join the cyberspace as generators of ideas rather than as mere recipients. Otherwise, the Internet will become a new form of dependence, some sort of cultural imperialism and cyber neocolonialism, which will further deteriorate the position of the African continent in the world (p. 51). Cooperation between institutions of higher education in Mauritius and other countries with a technology emphasis, such as South Africa (Czerniewicz, 2004), may present an opportunity to address this challenge.

However, such educational cooperation may fail to bear fruit in other African countries due to under-developed infrastructure, especially in the communications sector. If Mauritius is relatively better positioned today than its neighbors to participate in the burgeoning global economy, it is because of its past investments in infrastructure and its economic success of recent decades, in addition to its current proactive strategy. Many other African countries are burdened with intractable immense economic and social problems. As suggested by Sonaïke (2004, p. 43), "The ultimate challenge facing the African continent is how to get the most out of the new medium [Internet] without derailing existing development priorities."

In short, the Mauritius model may require modification for application in other African countries. Each country and region needs to develop its ICT strategy in the context of its own set of constraints, resources, and priorities. The details of the approach to ICT development require a comprehensive, country by country assessment.

Conclusions, recommendations, and study limitations

Attitude toward Internet use appeared to be positive for both samples. This bodes well for any country aspiring to reap the

benefits of the information economy. Conditions in both universities seem to encourage students to be open to using the Internet. Educational administrators and faculty in Mauritius might take further steps to increase students' Internet use at the university level. This effort would require commitment of resources but given the economic strategy that the country plans to pursue, the investment appears necessary and will most likely result in worthwhile returns. Mauritius is in a position to transfer Internet skills through university education to the professionals of tomorrow. The culture and infrastructure of the country make it well placed to encourage greater Internet use in other African nations. National states of Internet readiness however will have a bearing on the benefits that countries gain from the Mauritius experience.

Recommendations include: (a) Internet access should be available to students. The data suggest that students have a positive attitude toward usage but their extent, frequency, and types of use appear to be less than that in the U.S. sample. It seems plausible that the inhibiting factor may be a lack of access. (b) Opportunities should be increased for students to obtain university training in Internet use. Previous research has suggested that training is related to Internet usage.

These conclusions should be interpreted with caution however, because the present study's methodology involved certain limitations. The sample was not randomly selected and therefore may not be representative of the populations of college students in each country. Aside from the behavioral and attitudinal variables addressed here, other factors such as web site languages and connection speed may influence student Internet use. These factors should be considered in future research to obtain a more complete view of what might encourage greater Internet involvement across different cultures.

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Appendix 1: Measurement Items

Measure: Types of Internet Experiences - Please rate the extent of your experience in working with the Internet, by marking ONE choice for each item.

Accessing the Internet. Using Internet search engines, such as Google, Infoseek, etc. Sending or receiving e-mail. Reading articles, news, or weather reports on the Internet. Downloading files from the Internet. Creating web pages. Maintaining web pages. Purchasing products over the Internet.

The above items were measured on a five-point scale, where 0 = none; 1 = some; 2 = moderate; 3 = extensive; 4 = very extensive

Scale: Attitude - Please mark ONE response about using the Internet on each of the following items based upon what you think to be the most appropriate response for filling in the blank.

All things considered, my using the Internet for my courses is a _____ idea.
(Good/Bad)

All things considered, my using the Internet in my courses is a _____ idea.
(Foolish/Wise)

I _____ the idea of using the Internet. (Like/Dislike)

Using the Internet would be _____. (Unpleasant/Pleasant)

The attitude items were measured on a seven-point scale: 0=extremely; 1=quite; 2=slightly; 3=neither; 4=slightly; 5=quite; 6=extremely.

