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INFORMATION AND COMMUNICATION TECHNOLOGY LITERACY HERE AND ABROAD: A COMPARISON OF COLLEGE STUDENTS IN THE U.S. AND THE BRITISH VIRGIN ISLANDS

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ABSTRACT

Information technology literacy has become a global imperative. This paper compares perceptions of ICT competency of freshmen enrolled in a public US university with students attending a community college in the British Virgin Islands. Participants completed a self-assessment instrument that addresses three broad areas of IT competency: computer hardware, networking and systems software; application/productivity software; and the Internet and information literacy. While there were significant differences between the two student groups on some individual items, the basic ranking of skill levels was remarkably similar. The findings, some intuitive and others unexpected, create starting points for further investigation. More importantly, the findings underscore the need for educational institutions around the globe to implement standardized assessment of IT literacy.

Keywords: IT literacy, ICT, IS education, digital divide

I. INTRODUCTION

Information technology literacy has become a global imperative as computing and communication technologies have transformed economies and societies. Computer use is nearly ubiquitous in developed countries but developing countries also see information technology as a means to achieve economic growth and development. Information and communication technology (ICT) is seen as means to address challenges such as eradicating extreme poverty, combating serious disease and facilitating the offering of universal primary education (Parliamentary Office of Science and Technology, 2006). Much of the focus on ICT has centered on the *digital divide*, the gap that exists between people with and without access to ICT resources. Wide disparities in access exist between developing countries, but there are also gaps between different socio-economic groups within countries. While the digital divide is often defined in terms of physical access to ICT resources, many other factors contribute to the gaps [Parliamentary Office of Science and Technology, 2006]. These factors include language and reading literacy, numeracy, and general overall education opportunities.

In many societies, reading, writing and arithmetic abilities are readily assessed, whereas widespread assessment of IT literacy has yet to occur. Moreover, a universal definition of IT literacy does not exist even though there has been much discussion about what constitutes computer literacy. In general, IT literacy is posited to include knowledge of basic computer terminology and operations, functional use of productivity software, and basic skills in searching the Internet and using applications such as e-mail and instant messaging [Perez and Murray, 2006]. Using a self-assessment instrument built on these dimensions, this paper compares perceptions of ICT competency of freshmen enrolled in a public US university with students attending a community college in the developing country of the British Virgin Islands.

II. BACKGROUND

The British Virgin Islands (BVI) are located in the Caribbean, east of Puerto Rico, and are comprised of 36 islands, 16 of which are inhabited. In terms of terrain, the islands are both volcanic and coral. The BVI is a self-governing territory of the United Kingdom but has close ties with the United States due to its proximity of the American Virgin Islands. As of 2005, the population was estimated to be 22,000. Eighty-three percent of the population is black, and the remainder are white, Indian, Asian, and ethnic mixes. Even though the BVI is considered to be one of the most prosperous nations in the Caribbean, it is still a developing country. Tourism is the primary basis of its economy but it also maintains a large financial services industry. However, the economics of the country are not evenly divided; a majority of the citizens are poor. Outside the tourist areas, the country's infrastructure is inconsistent. Spot water shortages and electrical outages are common. Further, as an island community that imports the majority of its goods, basic food and substance costs are high.

The BVI provides support for both government and private schools. Education in the primary years is compulsory until the age of 14 and they report a literacy rate of 97.8%. However, again inconsistencies exist. Wealthier private schools have access to a wide array of resources. Many government-sponsored schools lack not only resources, but often also lack infrastructure. It is not uncommon to find schools in poor repair.

The schools are organized into lower primary and upper primary schools, many holding multi-aged classes. The programs are organized into Forms ranging from Form 1 through Form 5. High school is often completed at the end of Form 5, equivalent to the high school experience in the United States. Approximately 60% of the population completes Form 5. However, very few students go on to post-secondary education. Most teachers begin teaching right out of high school and those who wish to continue a teaching career are required to complete an Associate Degree program. A college degree is required to advance to a higher pay scale.

The BVI has just one institution of higher education. H. Lavity Stoutt Community College (HLSCC) is located just outside the capital, Road Town, on the island of Tortola, the largest island of the BVI. The core offerings of the college are two-year degree and certificate programs. The college describes itself as a comprehensive college that offers university-parallel programs designed to prepare students for transfer into upper division baccalaureate programs through partnership agreements with the University of the West Indies and other universities located in the United States, Canada and the United Kingdom. The college works closely with the University of the West Indies, (UWI), in a partnership agreement to extend college upper division offerings to teacher education candidates. UWI has an office and Continuing Education facility located on the HLSCC campus.

III. RESULTS AND DISCUSSION

This study compares college student perceptions of their ICT literacy. Students were administered a fifty question self-assessment instrument that addresses three broad areas of IT competency: computer hardware, networking and systems software; application/productivity software; and the Internet and information literacy. Additional items address motivation and interest in using computing. The items appear in random order on the questionnaire (Appendix I). Students were asked to respond to each item on a Likert scale of 1 (strongly disagree) to 5 (strongly agree).

Study Participants

H. Lavity Stoutt Community College in the BVI has an enrollment of approximately 800 students pursuing a Higher Education Certificate, an Associate's Degree or a vocational certificate. Students pursuing either the Higher Education Certificate or the Associate's degree must complete a set of general education requirements in addition to courses related to their program of study. As part of the general education core program, all students are required to

take an introductory computer course. The survey was administered during the fall semester 2007 to 41 students enrolled in coursework leading to a higher education 2-year degree (as opposed to a vocational certificate).

Kennesaw State University (KSU) is a member of the university system of the state of Georgia in the US. KSU is a comprehensive university that offers undergraduate and graduate degrees, including a first doctoral program in education. KSU has an enrollment of just over 20,000 students. The survey was administered to 84 students during the fall semester of 2007. All students were incoming freshmen enrolled in a computer literacy course. The test was administered the first day of class before any instruction occurred. Demographic data for both groups of students is presented in Table 1.

Table 1. Student Demographic Data

Students Enrolled in H. Lavity Stoutt Community College, BVI		Students Enrolled in Kennesaw State University, GA, USA	
	Number of Students		Number of Students
Age		Age	
18-20	19	18-20	75
21-23	6	21-23	4
24-26	4	24-26	1
27-29	0	27-29	1
30+	2	30+	3
No answer	10	No answer	0
Gender		Gender	
Male	11	Male	42
Female	30	Female	42
Major		Major	
Business	15	Business	12
Communications	0	Communications	4
Computer Science	2	Computer Science	4
General Studies	4	General Studies	0
Physical Sciences	2	Physical Sciences	16
Social Sciences	2	Social Sciences	7
Sports Management	0	Sports Management	6
Teacher Education	11	Teacher Education	2
Undecided	4	Undecided	31
Other	1	Other	2

Survey Results – Student Motivation and Interest

The survey items fall into four categories, as described previously. Each institution's weighted average on each item is presented, followed by an analysis of differences between the two groups using a t-test. The first category explores student motivation and interest in using computers. Students were asked to respond to such items as "I surf the web every day" and "I enjoy learning about new technologies." Table 2 reports findings in this category.

Table 2: Motivation and Interest in Computing

Item	BVI Wt Avg	KSU Wt Avg	Difference
I surf the Web every day.	4.02	4.20	-0.18
I consider myself computer savvy.	3.22	3.37	-0.15
I enjoy learning about new technologies.	4.20	4.05	0.15
I check my e-mail at least once a day.	3.78	3.86	-0.08
I enjoy using computers.	4.83	4.20	0.63**
I frequently use a search engine to find out about new computer technologies on the Web.	3.27	2.89	0.38
I frequently use instant messaging to chat with my friends.	4.63	2.85	1.78**

* $p < .05$. ** $p < .01$.

Students at both institutions said that they enjoy using computers. They also have in common that they frequently surf the web and check e-mail. A significant difference exists between the groups on two items. It should be noted, however, that no student from either country strongly disagreed with the statement, "I enjoy using computers." The biggest disparity was in instant messaging, which BVI students reported using significantly more than KSU students.

Hardware, Networking and Systems Software

IT literacy includes being able to carry out basic functions on the computer. This includes an understanding of basic hardware components and the ability to complete basic tasks in an operating system. Given the fact that most computers today are networked and connected to the Internet, students

should also have a basic awareness of network fundamentals. Table 3 presents student responses in this area.

Table 3: Hardware, Networking and Systems Software

Item	BVI Wt Avg	KSU Wt Avg	Difference
I know how to save files to different locations (e.g., desktop, hard drive, USB drive).	4.54	4.07	0.47**
I know how to use compression software such as Winzip to compress and decompress files.	2.83	2.45	0.38
I know how to burn a music CD.	4.05	4.48	-0.43*
I know how to change the device boot order.	2.63	2.10	0.53*
I know how to set up WEP on a wireless router.	2.66	2.30	0.36
I know how to download and install a software application.	3.90	3.95	-0.05
I know how to install and reinstall an operating system on a PC.	3.12	3.19	-0.07
I know the difference between a cold boot and a warm boot.	2.41	1.90	0.51*
I know how to empty the disk and memory cache in the browser to free up space on the hard drive.	2.98	2.83	0.15
I know how to rip a music CD.	3.63	3.73	-0.10
I know how to update the virus definitions of an antivirus application.	3.27	3.10	0.17
I know how to change BIOS settings.	2.41	1.90	0.51*
I know what causes hard drive fragmentation.	2.59	2.17	0.42
I know how to change the settings on a computer using the Control Panel.	3.95	4.06	-0.11
I know how to back up files to a CD or DVD.	3.27	3.50	-0.23
I know how to determine how much RAM is installed on a computer.	2.85	2.88	-0.03
I know what a file extension such as .pdf, .doc, or .zip implies about that file.	3.41	3.02	0.39
I know how to identify what operating system version is installed on a computer.	3.54	3.06	0.48*
I know how to identify the speed and type of microprocessor in a computer.	3.07	2.54	0.53
I know how to install an internal hard drive.	2.88	2.15	0.73*
I know the difference between RAM and ROM.	4.05	2.43	1.62**
I know how to transfer photographic images from a digital camera to a computer.	4.46	4.31	0.15
I know how to find and install security patches for a computer's operating system.	2.83	2.52	0.31
I know how to defragment a computer's hard drive.	2.93	2.50	0.43

* $p < .05$. ** $p < .01$.

While there are differences in some of the responses in this category, there were many similarities in the ranking of skills. That is, items that received

the highest reported skill level by students in the BVI were also the highest for students at KSU. This is also true of skills receiving the lowest ratings. For instance, both groups reported knowing how to copy files to different locations and how to transfer images from a digital computer to a camera. On the other hand, both groups reported lower ability in more technical areas such as changing device boot order, changing bios settings and defragmenting disks. KSU students reported higher skill in both burning music to a CD and backing up data to a CD. Students in the BVI reported higher skill in identifying system and operating system properties such as amount of RAM installed, version of the OS and type of processor installed.

Productivity Software

Productivity software refers to applications such as word processing, spreadsheet, presentation, desktop publishing, image editing and database software. Table 4 presents student responses related to productivity software.

Table 4: Productivity Software

Item	BVI Wt Avg	KSU Wt Avg	Difference
I am skilled in using a word processing program such as Microsoft Word.	4.24	4.07	0.17
I know when it is more appropriate to save an image as a GIF rather than a JPG.	2.80	2.31	0.49*
I know what the intersection of a row and a column is called in a spreadsheet.	3.76	3.17	0.59*
I know how to create a PowerPoint presentation.	4.15	4.43	-0.28
I know what the keyboard shortcuts Ctrl-V and Ctrl-C do.	3.44	3.45	-0.01
I know the result a spreadsheet would return when an equation such as =2+2*6/3 is entered.	3.37	2.77	0.60*
I know how to crop a photographic image.	3.76	3.87	-0.11

* $p < .05$. ** $p < .01$.

Student responses in this area were fairly similar. Students in both groups highly rate their skills in word processing and presentation software. In the same way, ratings reported by both groups were lower on items related to image processing. Students in the BVI did, however, report greater skill with spreadsheets. All-in-all, with the exception of Word and PowerPoint, student

ratings for items in this category were below 4.0. This is interesting given that an assumption exists that students come to higher education with a basic understanding of functional skill in using basic office applications.

Internet and Information Literacy

An integral aspect of IT literacy today is the ability to use the Internet and World Wide Web, particularly with regard to being able to find information online and assess its validity. Table 6 presents student responses to questions about information literacy, web browser settings, and ability to create web pages.

Table 5: Internet and Information Literacy

Item	BVI Wt Avg	KSU Wt Avg	Difference
I know how to use an FTP or SSH program to transfer files to a remote system.	2.20	2.02	0.18
I know how to enable and disable a pop-up blocker in a web browser.	3.83	3.92	-0.09
I know how to create a web page in a text editor.	2.59	2.32	0.27
I have an account on MySpace, FaceBook or another social networking web site.	4.02	4.32	-0.30
I know how to receive information via an RSS feed.	2.66	2.17	0.49*
I know the difference between a search engine, a subject directory, and a meta-search tool.	3.12	2.60	0.52*
I know how to use a Boolean search to find information on the Web.	2.95	2.12	0.83**
I know how to use a WYSIWYG editor to create a Web page.	2.44	1.82	0.62**
I know how to disable and enable cookies in a Web browser.	2.76	3.01	-0.25
I know the difference between a relative and absolute file address in a hyperlink.	2.71	2.11	0.60*
I can distinguish reputable from non-reputable sources of information on the Web.	2.59	2.60	-0.01
I know how to delete the history of sites visited in a web browser.	3.88	3.81	0.07

* $p < .05$. ** $p < .01$.

As seen in other categories, there were some differences identified between the BVI and KSU students but item rankings were fairly similar. Additionally, in items demonstrating a statistically significant difference, BVI students reported higher ratings. Only three items received ratings greater than 3.5 and these ratings were the same for both groups. Students reported having accounts on Facebook, and knowing how to manipulate the browser to control pop-up blockers and delete the history of web sites visited. Both groups reported

relatively low experience creating Web pages and using the File Transfer Protocol (FTP) used to upload files to a web server. KSU students rated themselves lower than BVI students on these items. Results were mixed on items addressing information literacy, but both groups averaged less than 3.0 on these items. BVI students rated their knowledge of Boolean search operators significantly higher than did KSU students.

While most students today are exposed to computers and use the Internet, a gap is emerging between functional and analytical uses of computing technologies. That is, exposure does not equate to understanding. Students may be able to use a word processor and surf the Internet, but they often do not understand how these technologies work or know how to accomplish more advanced tasks such as a mail merge. This study compared the perceptions of IT competency between incoming freshmen in a public university in the United States with students enrolled in a community college in the British Virgin Islands. While there were significant differences between the two student groups on some individual items, the ranking of skill levels was remarkably similar.

Further investigation of areas where major differences existed between the groups is needed. For instance, the largest reported difference was on the item that addressed the use of instant messaging. Students from the BVI reported much higher use of instant messaging. However, the questionnaire does not address possible reasons for the difference. Perhaps KSU students rely more on text-messaging and other alternatives to instant messaging; mobile phone costs are substantially lower in the U.S. than in the BVI.

A limitation of this study is that its measures of knowledge and ability are self-reported. Further investigation is needed to ascertain whether those reflections equate to actual knowledge. Another interesting exploration would be to identify cultural and other factors that bias self-reported knowledge.

IV. CONCLUSION

Most college students today have some idea of how their skills compare to the abilities of their peers in the three literacies: reading, writing and arithmetic. Anecdotal evidence – a show of hands in a recent class – indicates that a majority of college freshmen remember their SAT math and verbal scores. In developed countries, there is a well-established history of measuring and remediating abilities in the three literacies. In contrast, most students have no objective or relative measures of their IT literacy, which has been termed the fourth literacy. This paper compared perceptions of IT literacy among college students in the US and the British Virgin Islands. The findings, some intuitive and others unexpected, create starting points for further investigation. More importantly, the findings underscore the need for educational institutions around the globe to implement standardized assessment of IT literacy.

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ABOUT THE AUTHORS

Meg Murray is an Associate Professor of IS at Kennesaw State University, Kennesaw, GA. She has extensive experience in academe and industry. Her current work is in the area of web services and using XML as a medium for data exchange and she has been an author and presenter on the technical and societal implications of the evolving software paradigm referred to as 'Software as a Service.' Dr. Murray has a great deal of experience in curriculum development where she has developed instructional materials in the areas of XML, creating web services and teaching database concepts. She was the recipient of the KSU College of Science and Mathematics Distinguished Teaching Award and was a semifinalist for Women of the Year in Technology in Georgia.


Jorge Pérez is an Associate Professor of Information Systems, Associate Director of the Center for Hispanic Studies, and CETL Faculty Fellow for E-Learning at Kennesaw State University. He holds a Ph.D. in management information systems from Florida State University and has over twenty years of experience in the field as a consultant, systems analyst, web developer and educator. Professor Pérez teaches e-business, web development and informatics at the undergraduate and graduate levels. He has published research on IT literacy, IS curriculum, information security, diffusion of innovations, and organizational learning. His current research focuses on identifying, assessing and amplifying competencies that are needed by any informed user of information technology and the Internet. He may be contacted at jperez@kennesaw.edu.

David R. Murray is a retired professor of education and was a Visiting Rotary International University Teacher/Scholar for 2007-08 assigned to British Virgin Islands. Over the last thirty years, Dr. Murray has served as a public school teacher, college professor, administrator and former state educational official. His research interests include general teacher education, instructional technology and international development. He may be contacted at drsmurray@gmail.com.

APPENDIX 1

ICT Self-Assessment Survey

IS 2101 Information Technology Self-Assessment					
Name:			Section:		
Major:		Age:		Gender:	
Instructions: Circle one choice to indicate how strongly you disagree (D) or agree (A) with each statement.					
Question	Scale				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I surf the Web every day.	SD	D	N	A	SA
2. I am skilled in using a word processing program such as Microsoft Word.	SD	D	N	A	SA
3. I know when it is more appropriate to save an image as a GIF rather than a JPG.	SD	D	N	A	SA
4. I know how to save files to different locations (e.g., desktop, hard drive, USB drive).	SD	D	N	A	SA
5. I consider myself computer savvy.	SD	D	N	A	SA
6. I know how to compress (zip) and decompress (unzip) files.	SD	D	N	A	SA
7. I know how to use an FTP or SSH program to transfer files from a local system to a remote system, and vice-versa.	SD	D	N	A	SA
8. I enjoy learning about new technologies.	SD	D	N	A	SA
9. I know how to burn a music CD.	SD	D	N	A	SA
10. I know how to change the device boot order.	SD	D	N	A	SA
11. I know what the intersection of a row and a column is called in a spreadsheet.	SD	D	N	A	SA
12. I check my e-mail at least once a day.	SD	D	N	A	SA
13. I know how to enable and disable a pop-up blocker in a web browser.	SD	D	N	A	SA
14. I know how to secure a wireless router.	SD	D	N	A	SA
15. I know how to create a web page in a text editor.	SD	D	N	A	SA
16. I know how to download and install a software application.	SD	D	N	A	SA
17. I enjoy using computers.	SD	D	N	A	SA
18. I know how to install and reinstall an operating system on a PC.	SD	D	N	A	SA
19. I know the difference between a cold boot and a warm boot.	SD	D	N	A	SA
20. I know how to empty the disk and memory cache in the browser to free up space on the hard drive.	SD	D	N	A	SA
21. I know how to rip a music CD.	SD	D	N	A	SA
22. I know how to update an antivirus program's virus definitions.	SD	D	N	A	SA
23. I know how to change BIOS settings.	SD	D	N	A	SA

 Continued on back.

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Question	Scale				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
24. I have an account on MySpace, Facebook or another social networking web site.	SD	D	N	A	SA
25. I know how to receive information via an RSS feed.	SD	D	N	A	SA
26. I know what causes hard drive fragmentation.	SD	D	N	A	SA
27. I know how to change the settings on a computer using the Control Panel.	SD	D	N	A	SA
28. I know the difference between a search engine, a subject directory, and a meta-search tool.	SD	D	N	A	SA
29. I know how to use a Boolean search to find information on the Web.	SD	D	N	A	SA
30. I know how to back up files to a CD or DVD.	SD	D	N	A	SA
31. I know how to determine how much RAM is installed in a computer.	SD	D	N	A	SA
32. I know how to use a WYSIWYG editor to create a Web page.	SD	D	N	A	SA
33. I know how to disable cookies in a Web browser.	SD	D	N	A	SA
34. I know the difference between a relative and absolute file address in a hyperlink.	SD	D	N	A	SA
35. I know how to create a PowerPoint presentation.	SD	D	N	A	SA
36. I know what a file extension such as .pdf, .doc, or .zip implies about that file.	SD	D	N	A	SA
37. I know how to identify what operating system version is installed on a computer.	SD	D	N	A	SA
38. I know how to identify the speed and type of microprocessor in a computer.	SD	D	N	A	SA
39. I know what the keyboard shortcuts Ctrl-V and Ctrl-C do.	SD	D	N	A	SA
40. I know the result a spreadsheet would return when an equation such as $=2+2*6/3$ is entered.	SD	D	N	A	SA
41. I can distinguish reputable from non-reputable sources of information on the Web.	SD	D	N	A	SA
42. I know how to install an internal hard drive.	SD	D	N	A	SA
43. I know the difference between RAM and ROM.	SD	D	N	A	SA
44. I know how to crop a photographic image.	SD	D	N	A	SA
45. I frequently use a search engine to find out about new computer technologies on the Web.	SD	D	N	A	SA
46. I know how to transfer photographic images from a digital camera to a computer.	SD	D	N	A	SA
47. I know how to find and install security patches for a computer's operating system.	SD	D	N	A	SA
48. I know how to delete the history of sites visited in a web browser.	SD	D	N	A	SA
49. I know how to defragment a computer's hard drive.	SD	D	N	A	SA
50. I frequently use instant messaging to chat with my friends.	SD	D	N	A	SA

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