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DIGITAL RESEARCH CYCLES: HOW ATTITUDES
TOWARD CONTENT, CULTURE AND TECHNOLOGY
AFFECT WEB DEVELOPMENT

by

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A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in Texts and Technology
in the Department of English
in the College of Arts and Humanities
at the University of Central Florida
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ABSTRACT

It has been estimated that one third of the world's population does not have access to "adequate" health care. Some 1.6 billion people live in countries experiencing "concentrated" acquired immune deficiency syndrome (AIDS) epidemics. Many countries in Africa — and other low-income countries — are in dire need of help providing adequate health care services to their citizens. They require more hands-on care from Western health workers — and training so more African health workers can eventually care for their own citizens. But these countries also need assistance acquiring and implementing both texts — the body of medical information potentially available to them — and technology — the means by which that information can be conveyed.

This dissertation looks at these issues and others from a multi-faceted approach. It combines a survey of the developers of Web sites designed for use by health workers in low-income countries and a proposal for a novel approach to communication theory, which could help improve health communication and other social marketing practices. It also includes an extensive review of literature regarding a number of topics related to these issues.

To improve healthcare services in low-income countries, several things should occur. First, more health workers — and others — could visit African countries and other places to provide free, hands-on medical care, as this researcher's group did in Uganda. Such trips are ideal occasions for studying the cultural differences between "mzungu" (white man) and the Ugandan people.

A number of useful medical texts have been written for health workers in low-income countries. Others will be published as new health information becomes available. But on what medium will they be published? Computers? Personal digital assistants? During the past 10 years

the Internet became an ideal venue for conveying information. Unfortunately, people in target countries such as Uganda encounter cultural differences when such new technologies are diffused. This dissertation looks at cultural and technological difficulties encountered by people in low-income countries who attempt to diffuse information and communication technologies (ICT).

Once a technology has been successfully adopted, someone will look for ways to use it to help others. There are hundreds of sites on the Internet — built by Web developers in Western countries — that are designed for use by health workers in low-income countries. However, these Web developers also experience cultural and technological differences, based on their knowledge of and attitudes toward best practices in their field.

This research includes a survey of Web developers which determined their attitudes toward best practices in their field and tested this researcher's hypothesis that there is no significant difference among the developers' attitudes toward the content on their sites, their audience's cultural needs and the various technological needs their audience has. It was found that the Web developers agree with 17 of 18 perceived best practices and that there is a significant difference between Web developers' attitudes toward their audience's technological needs and their attitudes toward quality content and the audience's cultural needs.

Creation of the survey herein resulted in this researcher generating a new way of thinking about communication theory — called digital research cycles. The survey was based on a review of literature and is rooted in the belief that any successful communication of a computer-mediated message in the information age is a behavior which is influenced by the senders' and

receivers' attitudes and knowledge about textual style, the audience, technology and the subject matter to which the message pertains.

This dissertation is dedicated to: Sheila L. Scott, who inspires me; John C. Scott, who encourages me; and Teri-Jo B. Scott, who believes in me.

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LIST OF ACRONYMS

AED	Academy for Educational Development
AMA	American Medical Association
AMANDA	Aaron Marcus and Associates, Inc.
AMD	Advanced Micro Devices
ART	Antiretroviral Therapy
BMCF	Bishop Masereka Christian Foundation
CCUID	Cross-cultural User-interface Design
GEM	Gender Evaluation Methodology
HCI	Human-Computer Interface
HHS	Health and Human Services, U.S. Department of
ICD	Information and Communication for Development
ICT	Information and Communication Technology
IDRC	International Development Research Centre
IEEE	Institute of Electrical and Electronic Engineers
IGO	Intergovernmental Organization
INASP	International Network for the Availability of Scientific Programs
ISP	Internet Service Provider
IT	Information Technology
ITU	International Telecommunication Union
LRA	Lord's Resistance Army
LSHTM	London School of Hygiene and Tropical Medicine
NGO	Non-governmental Organization
NLM	National Library of Medicine
PDA	Personal Digital Assistant
PEPFAR	President's Emergency Plan For AIDS Relief

PHI	Public Health Informatics
SMS	Short Message Service
SRS	Simple Random Sampling
STC	Society for Technical Communication
TB	Tuberculosis
UNCTAD	United Nations Conference on Trade and Development
UNECA	United Nations Economic Commission on Africa
UNESCO	United Nations Educational Scientific and Cultural Organization
USAID	United States Agency for International Development
WHO	World Health Organization

CHAPTER ONE: INTRODUCTION

*“Technology is changing every night and every day.
So reading books makes you miss a lot.”
— Simon Okello, M.D.*

Part I: Connections

In this chapter I will explain the three major undertakings in this dissertation: a survey of the developers of Web sites designed for health workers in low-income countries, such as Uganda; a demonstration of how the elements of the health communication process fit into the traditional sender-receiver communication model; and how a model described herein is a novel approach to communication theory that can be used to aid in fields such as academic research, marketing and Web design. Then I will present background information, including a brief history of development in low-income countries and a discussion about culture in Uganda, an East African country ravaged by war and disease. The final three sections of this chapter delineate five goals for this research, four critical issues and an organizational plan.

Researchers estimate that one third of the world’s population cannot access “adequate” health care. Some 1.6 billion people live in countries experiencing “concentrated” acquired immune deficiency syndrome (AIDS) epidemics. Nine out of 10 people with HIV/AIDS reside in low-income countries and nearly half are women. More than 800,000 children are infected with human immunodeficiency virus (HIV), the virus that causes AIDS (European Federation of Pharmaceutical Industries and Associations 2000; World Bank n.d.). Though staggering, these statistics are not surprising. Many people in low-income countries suffer from micronutrient deficiencies, such as iron deficiency in their diets, and water-related diseases. Many also suffer from so-called “lifestyle diseases, injuries, and environmental pollution,” among other maladies and misfortunes (Friedlander 1997;

Novartis 2004, Commonwealth of Australia 2004). Created to alleviate these problems and others, the United Nations Millennium Development Goals include ending poverty and hunger, promoting child health and maternal health, combating HIV/AIDS, and promoting environmental sustainability and gender equity. This dissertation acknowledges the health care crises in various low-income countries. It recognizes the vital role scientific publications play in the efforts of health workers to treat patients in these countries and the growing importance of the Internet and its World Wide Web in the dissemination of health information. Additionally, it focuses on the view that health information on the Web is useful only when accurate and culturally sensitive, and when the technology is usable. To accomplish this, it explores connections between two important fields, health communication and communication theory. Three major projects are included. The first is a survey of the developers of Web sites (n=35) devoted to health information in low-income countries, regarding best practices in their field. The results of this survey generated data about these Web developers' beliefs regarding the content of their sites, their respective audiences and the technologies they are using. The survey results can lead to best practices in the development of Web sites used by health workers in low-income countries. Those best practices are discussed in the Data Analysis and Discussion chapters herein.

The second major undertaking demonstrates how the elements of the health communication process fit into the traditional sender-receiver communication model. It briefly discusses a history of 20th century communication theory models and explains how the traditional sender-receiver model can be updated. It suggests a communication model that modifies the information theory model to explain how communication flows. This approach includes a sender and a receiver, and considers how the attitudes and knowledge of both the sender and receiver affect their respective behavior (as reflected by the messages they send on Web pages and through e-mail feedback). It also includes four key variables: subject matter, kinds of writing (in some cases; textual style in others), audience and technology. The

model is demonstrated with health information as the subject matter.

Finally, this dissertation shows how the model has additional value. It can be used to aid in fields such as academic research, marketing and Web design. In the information age each of these fields requires a subject matter, a textual style, an audience and a communication technology.

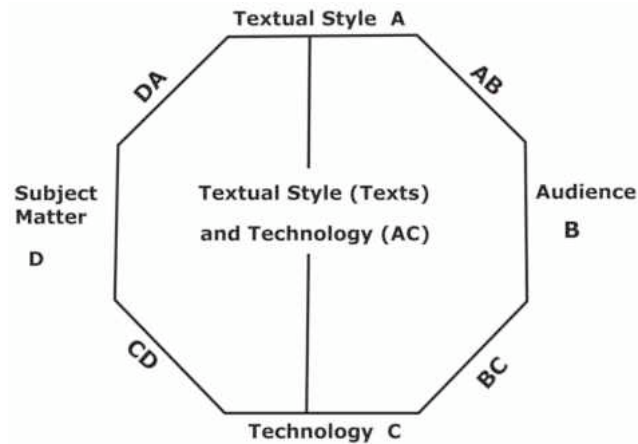


Figure 1. Four Areas of Communication

Plotting these variables on a diagram (Figure 1) shows that they can be combined, and that the result of these combinations will change when the variables are changed. For example, when the subject matter is an anti-smoking marketing campaign and the technology or distribution method is television, the text is always persuasive. But the way the message should be conveyed differs when the audience is children compared to when the audience is adults. Persuasion is one example of a textual style. Styles illustrate how a writer represents himself in prose, how one conveys a message. A useful list of textual styles includes narration, persuasion, explanation, description, imagination, exposition, definition, classification and process analysis. Different styles of writing have varying levels of formality and objectivity.

When a politician wants to promote her campaign for public office to an audience of senior citizens, the technology or distribution method she is likely to use is television, whereas she will

probably employ the Web for advertising her candidacy to college students. She must acknowledge the difference between writing for television and writing for the Web. Meanwhile, Amber Alerts could either be transmitted on a digital road sign or broadcast via radio. A florist might send a message via e-mail, or a text message, to promote Valentines Day sales.

Sometimes the subject matter is changed. For example, World Vision may have an audience of poor people in rural India, and have access to radio for communicating to its audience in a persuasive style. But what should the subject matter be? The health care situation in the community may dictate that residents need to be persuaded to participate in a campaign to improve access to clean water more than residents need to be persuaded to stop smoking, so the former subject matter is chosen and a clean water campaign is initiated.

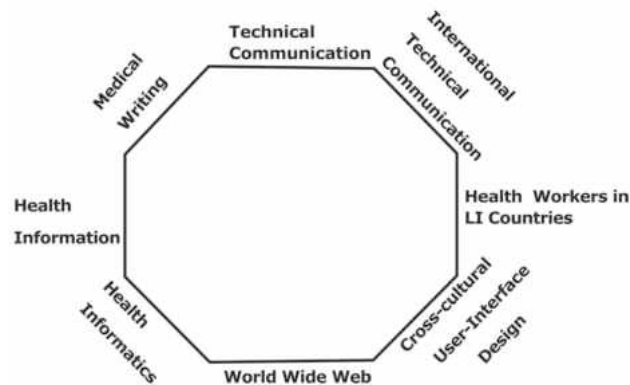


Figure 2. Four Areas of Communication (With Variables Plugged in)

People disseminate health information and all other subject matter differently today than they did 20 years ago. That change was reflected in a review of health communication literature that helped generate the questionnaire items for the survey herein. There are four key variables (Figure 2). Health information is the subject matter and the World Wide Web is the technology or distribution method. In the information age, advances in digital technology enable the potential methods of distribution to increase dramatically. Health information and other subject matter can now be disseminated on many

digital devices that did not exist before the information age, when paper, pen and analog technology were the most prevalent forms of communication.

When the distribution methods increase, the potential number of receivers also increases and the health information gets a larger potential audience. Now health communication is no longer just a doctor-to-doctor (business-to-business) proposition. In many cases in Western and developed countries, the Internet has eliminated the physician as gatekeeper of health care information; patients can easily go online to learn about a disease before or after they are diagnosed as having it. However in low-income countries health workers still serve as the primary gatekeeper for health information distributed by Web developers. It is important to give them unfettered access to the accurate, culturally sensitive information they need.

When technological advances increase the audience for health information, more textual styles are needed. One can hardly imagine that the consumer-oriented WebMD Web site (2008) will supplant the New England Journal of Medicine (2008) as a leading source of academic health information, or imagine that doctors and their patients will one day regularly communicate using emoticons and the language of AOL Instant Messaging, such as the IM discussion below:

Physician: RUOK

Patient: :-)

But these new methods of health communication do have value to some audience members and reaching new audience members is a crucial element of successful communication. This instant message can be diagrammed in Figure 1, with the physician on the left side, as the source of a subject matter (health information). The patient is on the right side, with all other audience members. (In this way the cycle is similar to the Shannon-Weaver model.)

Because there are more communication technologies and the audience is larger now than 20

years ago, health communicators must study their audience and their technologies to determine the appropriate textual style to communicate their information. The Web developers who were asked to complete the survey herein created their sites by employing a number of types of writing, including — primarily — medical writing (a form of technical communication), journalism and marketing. There are many types of writing. Each type of writing includes multiple textual styles. For example, there are many genres or styles of journalism, from straight AP style to persuasive op-ed pieces. Journalists also write in degrees of style. Some stories are more objective than others. Some are more formally written than others. Both “types of writing” and textual styles “fit” the area at the top of the cycle that asks “How does the writer represent himself in prose?” or “How does he convey his message?” For simplicity, henceforth both “types of writing” and textual styles are referred to as “textual styles.”

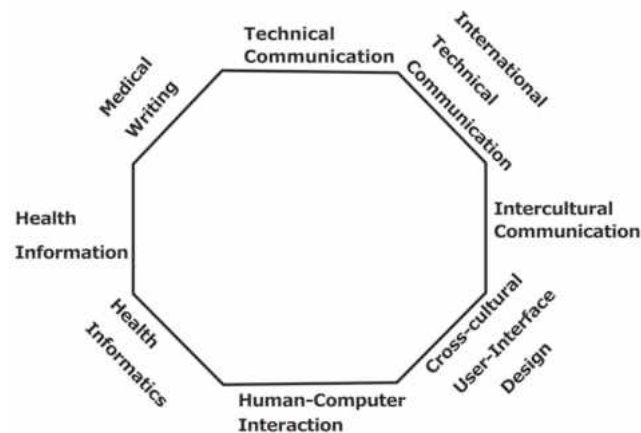


Figure 3. Four Areas of Communication (With Changes)

The model in Figure 2 can be further modified (Figure 3) as its research topics are narrowed. As previously stated, the subject matter herein is health information and the primary type of writing is medical writing, a form of technical communication. But because the World Wide Web and health workers are broad topics, they can be narrowed. Anyone studying issues related to health information in low-income countries also should study public health. Anyone studying the Web in general also should

study human-computer interface. Anyone studying how health workers in low-income countries use the Web should study intercultural communication. Altering the model to reflect these changes makes the results more specific.

After the topics are narrowed, connections can be found between the four variables (Figure 2, Figure 3). Medical writing is a connection between public health and technical communication; international technical communication is a connection between technical communication and intercultural communication; cross-cultural user-interface design is a connection between intercultural communication and human-computer interface and public health informatics is a connection between human-computer interface and health information. Each of these eight topics was studied to help generate the questionnaire items for the survey. The results of that study are in this dissertation. Appendix A is a preliminary survey from which the questionnaire was derived. The actually questionnaire is Appendix B.

The model herein resulted from research about health communication. Because the World Wide Web has become a leading source of health information, surveying Web developers' attitudes toward their work on health-oriented sites is a useful step in doing research about information theory. The survey asks Web developers for their attitudes and beliefs regarding their site's subject matter (content), its audience and the technology or distribution method used (the Web) because those attitudes and beliefs affect a Web developer's behavior, which is expressed in how he builds a Web site.

Meanwhile, health information is not the only subject matter than can be plugged into the model. It can be applied to any subject matter that one can communicate about, creating interesting links between that subject matter, the textual style, the audience and the technology or distribution method. Plugging any other subject matter into the model will change the other variables accordingly. For example, if a community outreach manager for the City of North Port, Florida, is tasked with

communicating information about city government activities, she must first answer several questions. What is her subject matter? Is it technical information e-mailed between city engineers engaged in a joint project (content known as “work product”) or is it an explanation of the project in general terms (known as public information)? Is her audience the engineers in her office, local journalists or the 56,000 citizens of the city? Is the proper textual style highly technical or one that will appeal to a person with eighth-grade reading capability? Finally, should the information be communicated in expensive, glossy hardcopy newsletters or on the World Wide Web? The answers to these questions will help her narrow her focus and convey her information to her audience efficiently. She can do this by exploring the links between the topics. Perhaps she decides the subject matter is public information, her audience is citizens and her technology or distribution method is the World Wide Web. But what textual style should she use? This is the unknown variable. Linking public information (subject matter) with a proposed textual style (eighth grade) she can search the Internet for links between these variables to help answer this question. She might find that

With the U.S. Department of Education’s National Adult Literacy Survey revealing that half of Americans are reading at the eighth-grade level or lower, many websites are also inaccessible because they are written at too high a level for many visitors to comprehend” (West 2003).

Learning this, she may decide to employ a textual style below the eighth-grade level on the Web site. The site is represented by Technology at the bottom of the cycle in Figure 1.

Sometimes the unknown variable will be technology. If a child has been kidnapped, the North Port Police Chief may want to alert citizens to watch for a specific vehicle. He has determined his subject matter (Look for a yellow car), a textual style (clear and concise; police jargon would be inappropriate) and an audience (citizens of Southwest Florida) but he needs to determine a technology.

Mentally linking his subject matter (abduction details) and his audience (citizens), he may determine that an Amber Alert issued through the Emergency Alert system (radio, television, electronic highway signs) is the appropriate method of communication. With digital technology there are even more mediums to choose from. For example, several years ago the governor of New York signed a bill into law that expanded Amber Alerts to include e-mail and text messaging (Government Technology, 2004).

Sometimes these determinations are based on prior knowledge. They seem like common sense and happen instantaneously. For example, for most newspaper publishers the decision to have a Web site was easy. In 1996 no one wanted to be the only publisher of a daily American newspaper with no presence of some sort on the Web. But sometimes implementation requires hours of research. Once the newspaper is online, decisions have to be made as to how much multimedia (audio, video) will be included in the Web presentation of an important story. In the case of both the easy and difficult decisions, the person communicating the information must make choices as to each of the four variables before the communication occurs.

Hofstede's Vision of Culture

In the introduction to *Culture and Organizations: Software of the Mind*, Hofstede and Hofstede (1997) write that people in different nations feel, think and act differently. Geert Hofstede hoped their book would “help in dealing with the differences” (p. 2). These differences are manifest online as well. Following this software subtext, Hofstede calls “such patterns of thinking [knowledge], feeling [attitudes] and acting [behavior] *mental programs* or ... *software of the mind*.” He also refers to culture as “mental software” (p. 3). Finally, he distinguishes narrow, black-tie culture (arts, dance, theatre) from broader “culture as mental software” that sociologists and anthropologists study, and acknowledges that

culture “is a catchword” for patterns of thinking, feeling and acting” (p. 4). Culture is what we know, how we feel and how we act.

Part II: Post War Development

A Brief History

Advances in digital technologies such as the ones mentioned above have led to progress in low-income countries as well as in developed countries. But post-World War II development has occurred much more slowly in low-income countries. During the 1950s, the colonial power of the United Kingdom, France and other European countries (Portugal, Belgium) was waning, the Cold War was freezing and low-income countries were suffering. It was in this context that development programs began to grow. Based on the success of the Marshall Plan in Europe, Western nations sought to bring “social and economic” improvements to what were then known as Third World Countries. The countries of Africa, Latin America and south Asia were in the “third world” because they were not under the direct control of the United States or the Soviet Union, who sought to influence them geopolitically through aid programs, both legitimate and illicit. The term “modernization” was derived for the process by which Third World Countries were influenced by their more powerful neighbors. Organizations such as the World Bank, the United Nations and the United States Agency for International Development (USAID) fueled the modernization process (Snyder in Mody, 2003, p. 168).

In 1962, as Schramm wrote a book about “the roles mass media can play in development” (Mody, p. 168), development specialists began to use information and communication technologies (ICT) to extend their reach. This led to improvements in various health communication initiatives, such as telecommunications infrastructure development, and growth in family planning campaigns and

agriculture outreach. Meanwhile, a handful of “socialist” countries embarked on “massive mobilization campaigns” (p. 168). Their goal was to help children and adults to adopt new behaviors related to birth control, marriage, rat eradication, latrines and other issues, based on Soviet ideology. One example was the Mtu ni Afya (“Man is Health”) campaign in Tanzania, which had three goals: encourage literacy; promote preventative health; and provide health education (Education Resources Information Center, 2009). Despite the best efforts of researchers during the 1960s — known as the Development Decade — unfortunate problems continued to persist. Population remained high in Third World Countries. Resource gaps remained between important groups: the wealthy and the poor, men and women. Some development projects were abandoned. Others were thought to be successful but instead they threatened the groups they were intended to help. “[D]ependency on industrialized nations and multinational corporations was increasing and environmental degradation accelerated” (p. 169). During the 1970s a paradigm shift occurred. The top-down modernization approach was replaced by an effort that emphasized meeting the “basic human needs” (p. 169) of people residing in Third World Countries. National budgets for agriculture, education and health projects increased in these countries while those of nongovernmental agencies (NGO) were increased as well. In the middle of the decade the World Health Organization (WHO), an agency of the United Nations, adopted the slogan “Health for All by the Year 2000.” The focus was thus shifted from curing disease to prevention and “widespread reach” (p. 169). The United Nations Children’s Fund (UNICEF) began using ICT to promote several key health care programs that dealt with diarrheal diseases, immunization and malnutrition. After a vast heart-disease prevention program proved successful in the United States, officials decided that such campaigns could yield results in Third World Countries (p. 169). Unfortunately, the funds the governments of these nations spent on domestic health care was reduced during the 1980s — due to decreases in oil prices and other fiscal woes — and they began to rely more on international donors. At

the same time, public health workers became aware of HIV/AIDS. As the Cold War ended, Third World countries became known as developing countries and — later — as low-income countries. But their problems remained and many of the solutions they sought for their health care woes remained out of reach. Meanwhile, culture in one particular low-income country, Uganda, was molded by colonialism, totalitarianism and war.

A Discussion of Ugandan Cultural History

Art History

Throughout history Ugandan artists have withstood wars, from the Bunyoro-Kitara war in 1898, and World War II (1939-1945) to the Kabaka crisis in 1966. More recently came the 1979 Liberation Front war between Uganda and Ugandan guerillas/Tanzania and the 1985-86 National Resistance Movement (NRM) war. The latter wars devastated the Ugandan economy and slowed funding for art, design and education. In recent years Uganda has continued to be faced with insurgence throughout the country. During these periods, art and design activity and appreciation were low (Miettinen, 2002). Culture in Uganda — a country in East Africa — exists in three separate and distinct time periods, before Idi Amin Dada took power, during his reign and after he was deposed. Amin ruled from 1971 — when he came to power after a coup d'état that deposed President Milton Obote — until 1979, when Tanzania invaded Uganda and Amin fled (British Broadcasting Corporation, 2008). During earlier British rule, Uganda was viewed as less strategically important to the British government than Kenya, which is to the east of Uganda. With less colonial oversight and regulation, Ugandan art education thrived. Blacks as well as whites took art classes at the Fine Art school at Makerere University in Kampala (then called the University of East Africa). According to Guruve (2008), Fine Art school founder Margaret Trowell's courses emphasized "the importance of building on existing artistic practices, but introduced new techniques such as silkscreen printing. This echoed the British style of

administration in protectorates; one of “indirect rule” where “colonial power structures used existing forms of government.” The period before Amin ascended also was marked by Uganda’s independence from Great Britain in 1962. Uganda then joined Kenya and Tanzania — who also gained their independence in the early 1960s — in forming the East African Community. Many hoped that the three newly free nations would share university facilities and that Uganda’s fine art school would be a leader in art education for the region (Guruve).

Despite tremendous national turmoil during Amin’s rule, the Fine Art school stayed open, and the Ugandan military played a role in its prosperity, commissioning insignias and medals. The military also contracted for sculptures and paintings. One positive (for art) aspect of this period was that young artists were able to break from the traditional values and styles of the colonial period (Guruve). But it still had a heavy Western influence, and in 1999, the School of Fine Art had the fourth smallest enrollment of the university’s 15 schools and colleges (Partnership for Higher Education in Africa, 2008).

Art plays a key role in Ugandan culture today. Through art Ugandans exchange information — which leads to knowledge — and attitudes that impact this country’s culture as well as its history. Through art, Ugandans share their aspirations and goals. They come together in agreement on issues of the day as well as ideals. Like a radio broadcast, art is a communicative act. It transmits culture. Anyone can be an artist at “all levels of Ugandan society” (Otiso, 2006). Ugandan sculptor Lilian Nabulime once stated that art “can overcome the limits of language and speech and communicate to an ethnically, culturally, and linguistically diverse audience” (Otiso).

While sharing some ideals, Ugandan artists have contrasting interests, styles and motivations. Daudi Karungi contemplates his art from a nationalist perspective. “My aim in general is to promote African art in an international market,” he said. “My aim ... is to investigate strategies for both art

production and promotion. I've always wanted to achieve things that seem impossible" (Musoke-Nteyafas, 2006a). Meanwhile, Eria Nsubuga 'Sane' focuses on nature. "My interests in art dwell around what is around me. Nature (and) day-to-day activities of the common man are my major sources of inspiration. I delight in simplicity, and as a result a lot of my work has been linked to naïveté. I however make no apologies for being true to myself" (Musoke-Nteyafas, 2006b). Miettinen stresses that "a great part of" Ugandan training in formal art and design emanates from secondary schools and universities that are influenced heavily by western, developed countries. Miettinen also stated that

Presently, we are making efforts to localize/indigenes the outlook and approach to art and design within the context of our cultures forging identity. We are warning up, enjoying the role of art in capacity building. ... Culture and art are interwoven and are communal" (Miettinen).

While Ugandan art is becoming more identified with the country itself, design plays a key role in health care.

Interpretation of Design

Today, the motto on the homepage of Makerere University's Web site (2008) is "We build for the future." Makerere still offers programs of study at what is now named the Margaret Trowell School of Industrial and Fine Arts. Design plays an important role in practical matters such as helping Ugandans diffuse innovations that lead to better health. For example, through the Design, Health and Community project (2007-2008), researchers learned the "role of design in the development of an integrated and symbiotic approach to health education and economic advancement" (Bitwork Technologies, 2008). This project, a collaboration of the Trowell school, the School of Design, Northumbria University, U.K., and the Department of Graphic Design, Durban University of

Technology, South Africa, focuses on “[c]apacity building for cultural enterprises, promoting an integrated and symbiotic approach to health education and economic advancement through socially responsive design solutions and entrepreneurial activities in Africa.” The goal of the partnership is to increase Ugandans’ interest in healthy behavior and increase economic development through design. This partnership aims to strengthen health awareness and facilitate economic development through design, “among rural and peri-urban craft communities with particular emphasis on women (sic) activities in three districts of Uganda namely; Kampala, Wakiso (central Uganda) and Rakai (southern Uganda).” During the partnership, methodologies of the South African *Siyazama* Project will be applied, tested, evaluated and refined “in a rural and/or peri-urban Ugandan craft community setting with particular emphasis on women’s activities” (England Africa Partnership, 2008). According to the Communication Initiative Network (2005),

The Siyazama Project is a rural crafts and HIV/AIDS education and design research project based at the Department of Graphic Design at the Durban Institute of Technology (DIT), South Africa. Its prime objective is to make an effort to ensure that the expert traditional craftswomen of KwaZulu-Natal survive the HIV/AIDS pandemic (Communication Initiative Network).

Literacy in Uganda

Information and communication technologies (ICT) have played a key role in Uganda in the development of programs that involve literacy. Distance learning efforts are benefitting from improvements in mobile phones, cameras, computer software and hardware, digital printing and portable FM radio broadcasting equipment (Pennells, 2005). However, the patriarchal nature of Uganda’s culture reduces the ability of this nation’s women to become literate and educated.

Using Computers

In 2005 there were only 200,000 computers serving some 26 million Ugandans (New Vision, 2005). It was also reported that more than 70 percent of Ugandans had never heard of the term “Internet.” These statistics, generated by Makerere University’s Directorate for Information and Communications Technologies Support (DICTS), spurred action. The data helped officials conduct new telecommunications research. They hope the project, bolstered by more than \$500,000 in government funds plus \$75,000 from the International Development Research Centre (IDRC), will “help them make informed decisions on what services to give Ugandans” (New Vision). Three years later, the population is thought to be 31 million and there are said to be two million Internet users, 6.4 percent of the population. There also reportedly are 1,200 subscribers to broadband services in Uganda, according to the International Telecommunication Union (Internet World, 2008a).

Meanwhile, Ugandans’ health care needs are immense. “Habari yako?” one Ugandan asks another, in Swahili. “How are you doing?” “Jambo sana,” the man replies. “I am well.” This is a conversation that many Ugandans long to have. Approximately one million Ugandans died of AIDS between 1983 and 2002 (Cabatu and Bonk, 2002). More Ugandans died of AIDS than those who were killed during some 15 years of civil war in that country (Okonkwo, n.d.). Meanwhile, nearly 80,000 Ugandans died of malaria in 2004 (ReliefWeb, 2005). And while there is currently a shortage of antiretroviral drugs in Uganda (Irin Plus News, 2008) that no amount of information and communication technology can resolve, wireless technology is being embraced by the health care community (Stiffin, 2006).

Part III: Rationale

One of the key components of improving health information in low-income countries is the advancement of technology. While health information has undergone many changes during the

information age, medical researchers have made tremendous progress — simultaneously devising new health care techniques and introducing many life-saving pharmaceuticals. As more treatments are approved for more diseases, providing health care in low-income countries has become more complex. To be effective, these advancements must be publicized in medical books and journals. Publishers (in source countries) and health workers (in low-income, target countries) both face obstacles. Publishers face logistical difficulty distributing hardcopy books and medical journals to health information posts in remote areas. These difficulties result in high costs, which are passed on to cash-strapped government health ministries and non-governmental organizations (NGO) in low-income countries. This was made worse by the economic restructuring of the 1990s, when book purchases and current subscriptions were reduced markedly at medical libraries in Africa. Textbooks became out of date. Academic journals were available but volumes were missing. Funding for new materials was unavailable at many universities (Lenny Rhine, personal communication, 2006). Today, publishers face the likelihood that information in hardcopy form, soon after publication, will become outdated and superseded by new information that will not be published in their books and journals and distributed to isolated areas soon enough to help health workers' current patients. Thus, health workers face the possibility of treating their clients without knowing the latest techniques. One solution is to publish health information instantly on the World Wide Web.

These Web sites — built by corporations and NGO Web developers — can be accessed by government health workers in low-income countries or by health workers at other NGO. An array of these latter organizations provide low-cost or free health care to clients in low-income countries. Many agencies — from Family Health International (FHI) (2008) and Family Care International (FCI) (2008) to the Micronutrient Initiative and the Medical, Eye and Dental International Care Organization (MEDICO) — have highly skilled staffs achieving laudable goals. Behind their similar names and

“catchy” acronyms, these are small organizations that are sustained by monetary gifts from individuals and groups. But many of these organizations also exist primarily through grants from foundations — such as the Bill and Melinda Gates Foundation and the Global Fund for Women — and intergovernmental organizations (public IGOs), such as the United Nations World Health Organization (WHO), the United States Agency for International Development (USAID) and the Canadian International Development and Research Centre (IDRC).

At the heart of the private NGO such as Family Care International are the paid and volunteer health workers, also known as “public health care workers” and “community health care workers” (Kidder, 2003, p. 33) such as Haitian doctors in a tuberculosis (TB) hospital. FCI, for example, has field offices in Latin America (Bolivia and Ecuador), the Caribbean and sub-Saharan Africa (Burkina Faso, Kenya, Mali, Niger, and Tanzania), with headquarters in New York (Family Care International, 2008).

Often health care projects led by these workers are stymied by poor communication, which is usually caused by inadequate technological infrastructure in low-income countries. Digital information is not always available instantly in low-income countries. There are many technical problems — such as low bandwidth — that can inhibit a health worker at an NGO or government health clinic from using the Internet effectively. Because of these difficulties, it may take minutes for health workers to download Web pages — if the pages download at all. Or images may download on the screen but be skewed because the user’s hardware or software is outdated. A researcher at the Makerere University Medical School in Kampala, Uganda, writes that information and communication technology (ICT) investment in rural areas is low because investors “shy away” (Simba, 2004). This occurs because of unfavorable conditions, among which are low purchasing power and high investment costs in areas where electricity is erratic or non-existent, and telephone lines are in short supply. More significantly, however, bandwidth problems in Africa can be attributed to a reliance on satellites for transmitting information,

not cables, like in Europe, the United States and Asia. Satellite transmission was described as “low-cost” in 2003 but with accompanying “hefty license fees ... [i]t is clear that policies for low cost ‘consumer grade’ satellite internet access have not yet been developed in many nations” (Sinha, 2003).

The signs of future improvement are mixed. According to the United Nations Conference on Trade and Development (UNCTAD) report, “Science and technology for development: the new paradigm of ICT” (Antony, 2008), the share of technology exports held by low-income countries is growing, although “the digital divide remains.” The digital divide is addressed in *Mountains Beyond Mountains*, a biography of Harvard anthropologist and global health physician Paul Farmer, M.D., Executive Vice President of Partners in Health, an NGO that is working to cure infectious diseases on several continents, but primarily in Haiti. It was written by Pulitzer Prize-winning author Tracy Kidder, who recounts telling Farmer, “... Oh man! It’s not enough that the Haitians get destroyed by everything else, but they also have an exquisite openness to being injured by words” (p. 28). Kidder was talking about how language can be manipulated, to the detriment of large groups of people. Language in a one-on-one conversation (such as a physical confrontation) can be deadly. Incorrect, inappropriate, or ill-considered health information, published for a mass audience, could potentially devastate an entire village. Conversely, if information is correct, appropriate, and properly disseminated, it can be useful to health workers in low-income countries, among others.

Disseminating and accessing health information via the World Wide Web is one solution to the quandary of how to make information transfers efficient. But new solutions create new challenges. Web developers must insure that their information is completely accurate, culturally sensitive and easily viewed. This is challenging, considering “completely,” “culturally” and “easily” are — ironically — terms that can be defined differently by people from different cultures.

There are many problems inherent in publishing and accessing health information online. One is the likelihood that this content, after it is posted online, will no longer be accurate because the Web developer chooses to leave it on the Web without updating it. Some Web sites, which cost pennies to store on computer servers, are created but never updated, despite the developer's best intentions. According to the Health on the Net Foundation's HON Code of Conduct (HONCode), Web sites consisting of clinical and medical content should include the date of creation as well as the date the site was last modified. It is vital "for the visitor to know if the health information presented is recent or several years old" (Health on the Net Foundation, 2008a).

Sometimes these sites are presented in a manner that is not consistent with the values or morals of the countries they are intended to serve. Online content also may not be written in languages that are indigenous to the people in the target countries. Even when translated accurately, information may not be appropriate. It may not meet the specific needs of the receiver. A Web site written in English may suit a health worker in Anglophile Uganda but it may be useless to a health worker in Francophile Ivory Coast. If the sender of the information does not address his audience appropriately, his information may be ignored. Meanwhile, when a person learns information in one culture, and communicates it to someone in another culture, the receiver will not always decode the information in the context that the sender intended. The importance of nuance in language was analogized when Farmer spoke to Kidder about anthropology: "As in mastering a language, one had to learn not just the literal meanings of words but also their connotations, and to grasp those one had to know the politics and economic systems and histories" (Kidder, p. 72). One must master the literal and connotative meanings of words in a culture's vocabulary, and have a keen understanding of that culture's political, economic, and social history, before using the World Wide Web to impart health information to that culture. Developers of successful cross-cultural Web sites are sensitive to the connotations of words, in the languages in which they are

presented online to health workers.

Rather than hardcopy books and journals, health workers in low-income countries are relying increasingly on digital technology to access the texts they use to treat people. This can be problematic. Often sites are inaccessible in low-income countries due to technological constraints, as previously mentioned. A Web site with many lines of sophisticated programming or that is graphically intensive is of no use to a health clinic in rural East Africa, where some basic Web sites take 30 minutes to load, if they load at all. When the technology works, tools such as satellite e-mail are invaluable, as doctors communicate across borders about diagnoses and cures. Communication technology is increasingly vital in rural clinics as well as among residents of rural villages. In *Mountains*, Kidder recounts a situation in which a client in a Haitian tuberculosis hospital tells Farmer, “No, Dokte Paul, [we are] not bourgeois. If we were bourgeois, we would have an antenna” (p. 31). The client is joking about the increasing presence of information and communication technologies (ICT) in his homeland, as represented by antennas that pick up radio signals. What he is experiencing in Haiti also is true in many other low-income countries. The low-income world is becoming more “bourgeois.” Its population is slowly becoming more technological.

Anyone who introduces communication technologies into low-income countries must do so responsibly. Considering the histories of decades of abuse and neglect by the former colonial powers, low-income countries have cultural issues and concerns about technology that deserve more than cursory attention. Once a technology is chosen and cultural considerations are addressed, a Web developer’s next step is to acquire content. The 498 Web sites devoted to health in low-income countries, whose developers were e-mailed the survey herein, are linked off a gateway called Essential Health Links that is part of the AED/SATELLIFE Web site (Academy for Educational Development/SATELLIFE, 2008a). SATELLIFE has assisted health workers for about 20 years in

countries where AIDS and malaria are common but medical journals and the Internet are not. SATELLIFE joined the Academy for Educational Development (Academy for Educational Development/SATELLIFE, 2008c), a non-profit international development organization, in July 2006 to create the AED/SATELLIFE Center for Health Information and Technology (Academy for Educational Development/SATELLIFE, 2008b). One of the key concepts on the AED/SATELLIFE Web site is the slogan “Content/Connectivity/Community,” three words that mirror an important theme throughout this dissertation that successful communication requires proper subject matter, technology and cultural sensitivity (AED/SATELLIFE, 2008d). (These health sites were previously linked off a gateway managed by the International Network for the Availability of Scientific Publications — INASP). Essential Health Links includes background information and Internet URLs for more than 700 health care-related Web sites, including 498 sites dedicated to health care in low-income countries. These organizations are managed — and each of their sites is maintained — independent of AED/SATELLIFE. At healthnet.org/essential-links, these sites are divided into three sections (General Health Resources, Specific Health Resources and Library and Publishing Support), which are further divided into approximately 85 sub-sections. (Criteria for how sites are chosen are detailed in the literature review.)

The 700 total Web sites linked off the Essential Health Links gateway are divided between those for developed countries and those for low-income countries. Most of these 700 sites were created apart from — and are independent of — the gateway site. A few of the sites are actually pages built by AED/SATELLIFE. However there clearly are not enough examples of these for one to call the gateway a vehicle for AED/SATELLIFE to promote its own content.

Operators of the gateway have never surveyed the sites’ developers to learn the attitudes that influenced the decisions they made when building the 700 sites. Several years ago, INASP officials

determined that they would benefit from a study to find out the attitudes of developers of the Web sites dedicated to health care in low-income countries. They were interested in studying concepts that might be useful in the development and evolution of these Web sites. Useful concepts, once found, could be promoted by Web developers to the other professionals they manage, work with, work for and represent, such as medical researchers, medical writers, media artists, Web producers, proofreaders, quality-assurance officers, programmers, and technicians, among others, who contribute to the construction of the sites.

The audience for this gateway is health workers, medical library communities, publishers, and NGO in low-income and emerging countries. The gateway's developers "do not have sufficient resources to evaluate the scientific accuracy of each website that is included in Essential Health Links" (Academy for Educational Development/SATELLIFE, 2008b). A survey of the developers' attitudes toward their sites was deemed an appropriate way to learn about the sites.

When this research began, the Health Links were linked off INASP. There were about 300 Web sites devoted to health workers in "developing" countries. Now that it is linked off the Essential Health Web site, Health Links includes nearly 500 dedicated to health workers in "low-income" countries.

Part IV: Goals

One goal of this dissertation is to survey Web developers and generate concepts that might be useful in the development and evolution of Web sites destined to be accessed by health workers in low-income (target) countries. Beyond that, the goals of this research are: 2) That those concepts are extrapolated into a compendium of best practices that could be presented professionally to Web developers and other project managers, in a hardcopy manual, online, on CDs and in workshops; 3) That Web developers and project managers would consider using these concepts and analyze other sites that

already use the modules — a “tool of modules,” as Rhine, calls it — when researching how to build Web sites accessed by health workers in low-income countries; 4) To help Web developers understand the needs of their audiences. It is important to establish baseline concepts, so that these sites — while they may become more generic after adaptation to the tool — will be more useful. 5) That the model will add to the literature about communication theory and help explain how people think when they are engaging in communicative acts such as marketing, Web design and academic research.

Part V: Critical Issues

The four critical issues to be studied in the present research are subject matter, audience, technology (or distribution method) and textual style. Each issue raises questions that are reflected in Likert Scale items on a questionnaire. Questionnaire items were gleaned by using a new communication model. Eighteen relevant and appropriate Likert Scale items were chosen for use in a survey of Web developers whose sites are designed for low-income countries (Appendix B).

Part VI: Organizational Plan

This dissertation includes six chapters:

Chapter 1: Introduction: Connections, post-war development, rationale, goals, critical issues and organizational plan.

Chapter 2: Literature Review — This chapter addresses numerous topics. First it looks at connections between health care in low-income countries and communication theory. The next section is about issues related to health communication surveys, including: cancer, sex, general health and human papillomavirus (HPV) in America; guidelines for international development programs; general health, AIDS and sexual health in Africa; malaria in Tanzania; tuberculosis and adolescent health in Africa;

general health, nutrition, hepatitis, reproductive health, malaria and smoking in Asia; and smoking in Europe. It then addresses surveys of Web developers.

Next this review addresses technology issues in low-income countries, including: access; low-end computing; rural telecentres (including disadvantages thereof); computer operating systems; bandwidth; and the 50 Percent by 2015 computer dissemination project and other projects involving Intel and Microsoft. This review then addresses communication theory, including seminal theories by Lasswell and Shannon and Weaver, plus other information theories by Gerbner, Newcomb, Westley and MacLean, Jakobson, Osgood and Schramm and Katz and Lazarsfeld. This section also focuses on problems with information theory. The next section introduces the digital research cycle, beginning with the core principle or thesis of the cycle, and the four variables that affect it (subject matter, audience, technology — or distribution method — and textual style). It also addresses attitudes, behavior and knowledge, related to communicative acts, connections between variables, how health care can be diagrammed via the digital research cycle, models and shapes in research and how the digital research cycle can relate to other communication theories. This review also addresses how the digital research cycle was used to write the survey herein (Appendix B) by doing a review of literature in the eight areas the digital research cycle establishes, beginning with health information. This review then addresses the history of medical writing as well as theories relevant to medical writing, such as the precaution adoption process model, the elaboration likelihood model of persuasion, the authoritative parenting model, natural helper models, community coalitions, community capacity, social capital theory, prevention marketing, conservation of resources theory, the theory of gender and power and the behavioral ecological model. It then addresses academic curriculum and ethics in medical writing, plus science journalism.

The review of literature then turns to technology, including public health informatics, looking at criteria for Essential Health Links, medical records, evidence-based health informatics, databases and ethics. The ensuing section — an extensive one — addresses concerns about the online audience, including intercultural communication. It looks at a number of theories, including coping with uncertainty, uncertainty reduction theory, anxiety uncertainty management theory, critical theory (Habermas) and critical theory (Deetz). This section also addresses cross-cultural adaptation and face negotiation. Finally, this section addresses the research on culture by Edward T. Hall.

The next section addresses textual style. It discusses the evolution of technical communication, and precedes a section on international technical communication. This final section of the literature review addresses localization, internationalization, globalization, concurrence, international user analysis, cultural bias, design issues, learning styles and writing issues.

Chapter 3: Methodology — Part I of this chapter addresses the population to be surveyed and the instrument to be used. It also addresses the rationale for a survey, strengths and weaknesses of survey research, subsets of populations, the instrumentation for the survey herein, the questionnaire and variables in the study and connections in research. Part II addresses the survey, including the research questions, null hypotheses, alternative hypotheses and the survey questionnaire items. The final section of Part II is about demographics. Part III addresses the plan for this survey research — including using Survey Monkey software to survey the respondents — and completing statistical tests using SPSS.

Beyond the scope of this dissertation, but a fertile area for expansion of this study, is whether — regardless of the Web developers' attitude and implementation of design protocols and cultural sensitivity — health care information does or does not reach the intended audience. Another expansion

could be whether technical communication makes no difference, some difference or much difference in health care delivery.

The next two chapters address the survey results, including what they indicate about health communication theories. This dissertation closes with a chapter that addresses conclusions and limitations of the research herein, as well as an extensive section of future research.

CHAPTER TWO: LITERATURE REVIEW

*“Who says what in which channel
to whom with what effect?”
— Herbert Lasswell*

Part I: Introduction

In this chapter I will explore connections between health care in low-income countries and communication theory. That will be followed by a review of literature about issues relevant to the survey herein, including health communication surveys and Web developer surveys. The next two sections discuss communication theory and introduce the digital research cycle as a useful communication theory for the information age. Following decades of civil war (Otiso, 2006, p. 12) and an HIV/AIDS epidemic (p. 1), Uganda now finds itself in a dilemma as “government spending on health care has been curtailed” due to government budget ceilings (Odaga and Lochoro, 2006). The country has a population of 31 million people. Given its current 3.3 percent growth rate, the population could double in 21 years. The East African country has an infant mortality rate of 68 deaths per thousand live births. The average lifespan is 52 years. Otiso (p. 3) attributes the latter two statistics to poverty, civil war and an HIV/AIDS epidemic, about which experts differ on the rate of decline (Weaver, 2006). With this critical array of social and political issues facing the low-income country, during the early 2000s the Uganda Red Cross Society sought to ensure that it recruit blood donors who are not HIV positive (Kanobe, 2004). Their goals were to improve the quality and quantity of donated blood, to improve record keeping and to promote the collection and proper use of blood. To that end, the Society embarked on a recruitment project involving digital technology (personal digital assistants). PDAs were seen as

efficient tools to screen (counsel) candidates prior to blood donation, register donors and retrieve results for post-donation counseling (Kanobe).

The project was undertaken by SATELLIFE and its affiliate, HealthNet Uganda. The PDAs, which incorporated Pedragon software and Microsoft Access databases, replaced the old card and notebook system. Records were kept in the PDAs, which were capable of sharing information via infrared ports. As a result of this project: 1) Donor screening data is now captured, processed and retrieved more quickly; and redundancies and inconsistencies in the data have been “totally” eliminated; 2) The increased record-keeping security (PDAs vs. paper files) has resulted in more safe blood being distributed. 3) Health workers can now more efficiently communicate with AIDS victims about their HIV status, counsel them and promote life-sustaining behaviors. 4) Donors are more confident in the computerized system, increasing the quantity of blood units collected (Kanobe). All of this was accomplished despite several obstacles. Power supplies, which were necessary to charge PDA batteries, were unreliable. There was a limited quantity of PDAs. Funding was low. Two technological adoption issues emerged: the unfamiliarity of Ugandans with electronic signatures and the resistance to change.

Research Connections

The Internet and its World Wide Web provide a platform on which the communication of information can be both robust and meaningful. But content is not always accurately portrayed. As with the resistance to change and unfamiliarity with electronic signatures, digital-media projects are not always culturally sensitive. As with the power supplies, they are not always technologically accessible. When it is difficult for a person without medical training to judge the accuracy of a project such as a Web site, one can turn to communication theory for help, for answers. Lasswell’s maxim about communication is that it has occurred if we can answer the question: "who says what to whom in what

channel with what effect?" (Fiske, 1990). But Lasswell's question does not ask the questions "why?" and "how?" By inquiring about the attitudes of Web developers toward their work, and their knowledge of it, this dissertation asks and answers the questions "why?" and "how?" What are the attitudes of the developers of the Ugandan PDA project above toward their content (also referred to as subject matter), toward their audience, toward the textual style they employ and toward the technology they use? What is their knowledge of the Ugandan people, the subject matter, the technology or distribution method and the Red Cross terminology (textual style)? Questions about the PDA project managers' knowledge of these variables also are important because they help users understand the rationale behind decisions made when the program was implemented.

This dissertation attempts to answer similar questions about the developers of Web sites devoted to health workers in low-income countries and linked off the Essential Health Web site. It also will show how communication theory can be used to answer questions about intercultural subjects that are communicated digitally. From looking briefly at these sites, one can learn much about them. For example, the International Diabetes Federation e-Atlas (International Diabetes Federation, 2008a) was designed for health workers in low-income countries. Its developer claims it is a "one-stop source of information on diabetes" (International Diabetes Federation, 2008b). But how reliable is the subject matter on the site? Is the content current? What textual style is employed? When the site was first observed for this study, it was being updated "to provide you with an even more useful site on diabetes ... New features will be added to the site over the next few months," the site says (International Diabetes Federation, 2008b). The textual style is academic and technical (medical writing). The site includes rollover subscript with popup citations and a reference list at the bottom of a page about the incidence of diabetes (International Diabetes Federation, 2008c). The technology or distribution method is the World

Wide Web. The site's audience is organizations similar to IDF. This is known because the organization's mission "is to work with our member associations to enhance the lives of people with diabetes" (International Diabetes Federation, 2008c). Here is information about another site linked off Essential Health: AIDS Education Global Information System (2008). The subject matter of this site is AIDS information and education. The site subscribes to the HONcode Principles (Health on the Net, 2008d). It is funded by a mix of corporations and foundations: Boehringer Ingelheim, Bridgestone/Firestone Charitable Trust, Bristol-Myers Squibb Company, Elton John AIDS Foundation, Gill Foundation, the National Library of Medicine, Quest Diagnostics, Roche and Trimeris. The site's audience is doctors, patients and medical historians who speak German, English, Spanish and Portuguese, who can access identical information written in American English, British English, French, German and Portuguese by clicking on the flags of these five countries. The textual style is a combination of technical communication (medical writing) and journalism. For example, on Feb. 28, 2009, an unnamed United Press International journalist writes the site's top story:

"WASHINGTON, Feb. 27 (UPI) -- U.S. President Barack Obama selected a health policy expert to be the country's top AIDS adviser" (United Press International, 2009).

The first paragraph answers four important journalistic questions: Who? Obama. What? Selected. Where? Washington. When? Feb. 27. The technology used is the World Wide Web. This site has an About Us page. At an early point in this research (2004) this site opened with a black and white splash page that utilized animated text. In 2009 the animation is gone but graphics are overused, as shown in Figure 4.



Figure 4. Graphics on AIDS Education Global Information System Web site

This page now loads slowly on a 2008 Macintosh and very slowly on a 2002 HP personal computer. While interesting, the information above provides minimal insight into why a developer chooses to use certain content, a specific textual style, the technology or distribution method or his audience. It does not assure a user that the developer sought to publish content that is accurate or culturally sensitive. It does not tell a user that he will be able to view the site on older computers with no difficulty. It does not tell the user whether the sender's textual style is appropriate. Surveys like the present one, which asks for the Web developer's attitudes and knowledge, do that. The need to study Web sites devoted to health workers in low-income countries is great. There is no other known study in the literature that considers a Web developer's behavior — the Web site itself — and includes a survey about the developer's attitudes and knowledge about the site and how it was created. There are many surveys focusing on health communication and health promotion campaigns. There are some about Web development. Thus the first section of this literature review looks at surveys dealing with health communication issues and surveys dealing with Web design issues.

The Ugandan researchers and health workers mentioned above use personal digital assistants to communicate information in a rural area of the world where telephone lines are virtually nonexistent but cellular telephones are commonplace. Many of the personal computers available are old and incompatible with current software. PDAs suit their needs but may not suit the needs of health workers elsewhere. Providing appropriate technology is crucial in low-income countries, because one-time financial investments and grants are not likely to be repeated, and projects with faulty data — due to

poor research standards — are likely not to be refunded. Whether working in Nigeria or India, Ethiopia or Vietnam, the goal of researchers and technologists always should be to provide technology that will work in the environment in which it is deployed. The second section of this literature review looks at technology in low-income countries.

The third section of this literature review provides a history of communication theory, including information about models by Lasswell, Shannon and Weaver, Gerbner, Newcomb, Westley and McLean, Osgood and Schramm and Jakobson. The Ugandan researchers and health workers above are using elements of Shannon and Weaver (1964, p. 7) first wrote about their model in 1949. Their information sources are the Red Cross, the health workers in the field and their patients. The message is the content of their reports. The PDA is the transmitter. The signal is wireless communication. The receiver is another PDA and the destination is either the Red Cross or the field worker's office (Kanobe). What is not known here is the textual style of the communications sent back and forth. Choosing the wrong textual style can impede the communication and damage the project. The fourth section of this literature review introduces a new communication theory model, called the digital research cycle, which incorporates some elements of the traditional sender-receiver models. The section concludes by showing extensively how the digital research cycle can be used to generate research to help build a survey questionnaire.

This dissertation draws from traditional communication theory and updates the terminology. What Shannon and Weaver call the message is called subject matter here. What they call the transmitter and the receiver is called technology or distribution method herein. What they call the receiver or destination is called the audience here. The model demonstrates how communication occurs. But the model has other uses. It can be used to demonstrate useful ways to do academic work. It can be used to

build better Web sites. It can be used to market a product or idea. The model proves useful in this research. The fourth section of this review explains how the model was used to find literature that was utilized to write a questionnaire for Web developers who build sites dedicated to health workers in low-income countries.

Part II: Health Communication/Web Developer Surveys

Health promotion, a key element of the Uganda PDA project, is “equally valid for prevention” of communicable and non-communicable diseases, injury and violence, and mental problems (World Health Organization, 2008a). It can be packaged many ways, from public promotion of National Health Days in Mexico which advocate smoking cessation and the elimination of sedentary lifestyles (Thai, Wimberley and McManus, 2002, p. 222) to the use of the Internet by health workers and patients seeking to send or receive health care information (Cockerham, 2001, p. 193). One of the most important aspects of health care in both developed and low-income countries is successful promotion of effective strategies for treatment and prevention of disease.

While health promotion is the dissemination of effective strategies for treatment and prevention, health communication is a similar but narrower concept. It is the tool for making that promotion successful. Health communication is defined as “... the crafting and delivery of messages and strategies, based on consumer research, to promote the health of individuals and communities” (Healthy People 2010 Objectives: Draft for Public Comment, 1998). If health promotion is a strategy, health communication is a tactic. Many health communicators — also known as health information workers — work in low-income countries to bring health care information to indigenous people. They supply information such as how to care for sick family members at home and whether or not (or how) to breast-

feed a baby. Health communication is vital at times when governments and non-governmental organizations need to inform the public about important health issues. The use of information and communication technologies (ICT) to disseminate health information increases awareness about the specific health care issue at hand as well as the overall importance of good health care practices (New South Wales, 2008). Health communication, which provides the tools for successful health promotion initiatives, relies heavily — but not entirely — on ICTs.

Health Communication Surveys

Though narrower than “health promotion,” health communication is a broad term that refers to information dissemination in many different health care situations. Learning this information increases a patient’s knowledge but also affects his attitudes and his behavior. It helps him avoid acquiring a disease or helps him treat it once he is afflicted. For some professionals who communicate health information to patients, the project does not end after the information is communicated. Researchers may survey respondents before and/or after they receive health information, to determine the clients’ knowledge of and/or attitudes toward a particular subject matter. They also may survey before and/or after subjects receive a medical intervention such as medication (taking medication is a behavioral act). They may survey once, with no information dissemination or health intervention involved, to get a snapshot of health-related data about a particular community at a particular time. That information can be used later. Surveys can be large (anti-smoking television campaign, n=103,172) (Robert Wood Johnson Foundation, 2006) or relatively small (awareness level and interest in the use of spiral CT for early lung cancer detection, n=514) (National Cancer Institute, 2008). The survey respondent is usually a patient, but the research could be inverted and the respondent could be the health worker or the person responsible for disseminating the health information, as is the case with the present study. Below are

some examples of health communication surveys.

Cancer in America

The Division of Cancer Control and Population Sciences at the National Cancer Institute published “Cancer Communication: Health Information National Trends Survey” (HINTS) in 2003 and 2005. The reports’ purpose is to offer ‘hints’ of where health workers can utilize communication-related research and intervention to make progress in population health. HINTS is a cross-sectional health communication survey of the U.S. civilian, non-institutionalized, adult population. HINTS researchers evaluated trends in health information usage over time and generated data for conducting future research “to assess the basic relationships among cancer-related communication, knowledge, attitudes, and behavior at the population level” (Rutten, Moser, Beckjord, Hesse and Croyle, 2007). Among the issues that were evaluated was how much Americans are exposed to the media; how much they are exposed to health information; how they use the Internet to research health-related issues; how they seek information about cancer; their perceptions of obstacles to seeking research on cancer, how they evaluate the effectiveness of the information they find and their knowledge of cancer. In both 2003 and 2005, HINTS utilized random digit dialing (RDD) to generate a probability sample of telephone numbers in the U.S. The survey generated n=6,369 survey respondents in 2003, n=5,586 in 2005. Among the findings: In 2003 slightly more than half the respondents (50.7 percent) indicated they had looked for health and medical information on the Internet for themselves. Two years later 58.4 used the Internet to look for health and medical information for themselves. In 2003, 45.8 percent of respondents reported looking for health or medical information on the Internet for others. In 2005 59.5 percent used the Internet to look for health or medical information for others (Rutten, Moser, Beckjord, Hesse and Croyle).

Sex in America

Bleakley, Hennessy and Fishbein (2006) sought to compare how Americans view sex education with how policymakers and research scientists feel about it. Between July 2005 and January 2006, a randomly selected, nationally representative sample of American adults ages 18 to 83 (n=1,096) was questioned. Survey respondents had three primary choices: abstinence only sex education, comprehensive sex education, and condom instruction. Bleakley, Hennessy and Fishbein found that 82 percent of participants indicated support for programs in which students are taught abstinence and other ways to avoid pregnancy and sexually transmitted diseases. Meanwhile, two-thirds (68.5 percent) favored teaching how to use condoms properly. Respondents were least likely to support abstinence-only programs (36 percent support and 50 percent opposition) across the three program options. Political persuasions affected responses somewhat. Self-identified conservative, liberal, and moderate participants all supported abstinence-plus programs, but their support varied “significantly” (Bleakely, Hennessy and Fishbein).

Health in America

Sometimes health communication surveys are combined with health examinations. The National Health and Nutrition Examination Survey (NHANES) sought to gather data on the health and nutrition of U.S. households. This research included both an in-home interview and a health exam. Questions about health status, disease history, and diet were asked during the in-home interview. Medical and dental examinations, physiological measurements and laboratory tests were elements of the health exam (Centers for Disease Control and Prevention, 2008, October). The respondents to the 2005-06 research, (n=12,862), were males and females ranging in age from less than 1 year old to more than 80 years old (Centers for Disease Control and Prevention, 2008, July). The survey showed that some 25 million

children and teenagers — about one-third of American kids — are either overweight or on the brink of becoming overweight. This is the highest number ever recorded. The survey also indicated that about 136 million — or two-thirds of — adults are overweight or obese (Hellmich, 2006).

HPV in America

In June 2006, the U.S. Food and Drug Administration (FDA) approved a vaccine that prevents human papillomavirus (HPV), “the most common sexually transmitted infection (STI) in the United States and the leading cause of cervical cancer” (Annenberg School of Communications, 2006). Later that year, researchers at the Center of Excellence in Cancer Communication Research at the Annenberg School for Communication at the University of Pennsylvania learned that how a vaccine for HPV is portrayed can help determine whether or not patients wish to be vaccinated. This research was part of the broader Annenberg National Health Communication Survey (ANHCS). A nationally representative sample (n=635) of U.S. adults over the age of 18 (49 percent were women) was randomly assigned to read one of three variations of a paragraph describing the vaccine. Some 63 percent of the women who read that the vaccine protects only against cervical cancer “indicated that they were ‘very likely’ or ‘somewhat likely’ to get the vaccine, whereas the women who read that the vaccine protects against cervical cancer and an STI responded ‘very likely’ or ‘somewhat likely’ only 43 percent of the time” (Annenberg School for Communication).

International Development Program Guidelines

Some non-governmental organizations conduct health communication surveys in low-income countries. Information and communication technologies (ICT) are major components of these health communication projects. In response, other organizations have adopted guidelines for conducting

research related to information and development. The Department for International Development in Great Britain developed a 40-page guide for “Monitoring and Evaluating Information and Communication for Development (ICD) Programmes.” Among the guidelines, are “tools of good practice,” including “questionnaires and surveys, observation, focus group discussion, in-depth interviewing, pre-testing, key informant interviewing, exit polls/intercept interviews, role-playing, drama and story-telling; log keeping, tracking or tracer studies and Delphic surveys (used to identify trends). One piece of advice offered in the guide: “So you should be aware that monitoring and evaluation processes rely on personal judgement (sic) as well as theory. Bear in mind that there is no single, best evaluation method” (Department for International Development, 2005).

Health in Africa

In Egypt, researchers were interested in communication about avian influenza. A combination of communication interventions made up the Communication for Healthy Living (CHL) Project there. The project’s motto was “Your Health is Your Wealth” (Soul Beat Africa, 2006). Researchers developed and implemented a multi-tiered bird flu preparedness effort, featuring: television, radio, and press announcements; Egyptian government Web site support; hotline promotion; press inserts; press briefings and journalist training; provider fact-sheets; community mobilization in partnership with non-governmental organisations (NGO); and consumer fliers, posters, and other printed information materials. They then conducted the Egypt Health Communication Survey (ECHS) to determine how useful and successful its family health communication activities are. The nationally representative sample (n=4,052) was of people ages 15-49 in 21 governorates. Results showed that 86 percent of the adult population — an estimated 38 million people — could recall messages from the campaign.

AIDS and Sexual Health in Africa

HIV/AIDS is a pervasive problem in South Africa. Females under age 40 and males ages 25-45 are the most severely affected. Officials have conducted many health communication interventions to educate the public about the disease. Parker (2006) studied the effectiveness of mass media interventions. He performed a cross-sectional household survey (n=7,006) of people ages 15-65 and found that: among those ages 15-24, 84.3 percent had been exposed to at least two radio messages per week about HIV/AIDS; 84.9 percent of those ages 25-49 had been exposed to at least two radio messages per week and 79.9 percent of those ages 50 and older had been exposed to at least two radio messages per week. The same study found that 46.3 percent of those ages 15-24 had been exposed to at least two community radio messages per week; 42.9 percent of those ages 25-49 had been exposed to at least two community radio messages per week and 37.4 percent of those ages 50 and older had been exposed to at least two community radio messages per week.

In a report to the International Development Research Centre (IDRC) — a Canadian organization that has a number of projects involving health care — on the relationship between HIV/AIDS and ICTs, Driscoll (2001) looked at data she collected through a review of the literature, a review of HIV/AIDS-related Web sites and surveys of discussion group participants and AIDS activists. One project she reviewed was the African Network for Health Knowledge Management and Communication, which began in Kenya in April 2000 to find new methods for using ICTs for community health. Data compiled in one field center through a baseline survey indicated that the HIV/AIDS prevention messages presented would have a larger impact if audio-visual aids were used. Driscoll reported that “[t]he project will now try to respond to this by providing HIV/AIDS health

education messages through video shows rather than the methods traditionally used in this community (Driscoll).

What roles do mass communication and interpersonal communication play in increasing knowledge of HIV/AIDS? Do they reduce stigmas, increase the use of condoms or increase the possibility of disclosing HIV test results to sex partners and family members? Hutchinson, Mahlalela and Yukich (2007) researched these questions in South Africa. They examined data from a 2002 household survey in the Eastern Cape Province. They hoped to measure levels of stigma, interpersonal communication, and willingness to disclose HIV test results and condom use, using a multilevel framework that accounts for “the social context in which individuals access information, gauge social norms, and make decisions about the costs and benefits of HIV testing and disclosure” (Hutchinson, Mahlalela and Yukich). Their results indicate that mass communication and interpersonal communication result in “positive effects.” Media exposure and informal social networks play a role in “changes in knowledge and stigma, which lead to behavior change” (Hutchinson, Mahlalela and Yukich).

AIDS has been less of a problem among young adults in South Africa since 1998 than it was before. Those people ages 15 to 19 years old (and those ages 20-24, to a lesser degree) have changed their behavior, studies show. Primarily, condom use has increased. But no studies established why the change occurred. Katz (2006) looked at how several information sources about AIDS impacted the use of condoms. Using the South Africa Demographic Health Survey of 1998 (1998 SADHS), Katz got responses from young, rural and urban South African females, “while controlling for various socioeconomic and cultural parameters.” Results indicated that condom use among urban residents was correlated positively with mass media exposure, television as a source of information about AIDS and

the number of mass media sources from which the respondent received information about AIDS. It was further shown that condom use among rural residents correlated with how many sources of information respondents had about AIDS, exposure to mass media and the language and education of the respondents. Condom use was almost twice as high among urban residents as among rural residents. Three factors — the threat of AIDS, mass media and receptiveness to condom use — influenced the increase in condom use among females.

Modern health communication relies heavily on mass media. The multimedia health promotion intervention project in South Africa called Soul City aims to promote HIV/AIDS awareness. The promotion campaign includes television and radio drama and print material. Researchers conducted national “before” and “after” surveys and a national qualitative study. In the before and after surveys, change was measured and then multiple regression analysis was performed to assess the variables associated with the change. The qualitative study consisted of focus group discussions, which were analyzed thematically. This research reveals many instances of community change and shows how the change happens at the community level (Tufté, 2001). Africa is a poor continent, riddled by war and/or AIDS in some areas. In regions where poverty, war and AIDS are prevalent, the combination is devastating. In regions with poverty and war, people are less likely to have knowledge they need or access to methods for preventing HIV-transmission. Researchers have learned from population probability surveys available through USAID-funded Demographic and Health Surveys, UNICEF’s Multiple Indicator Surveys and specialized HIV behavioral surveys that people in conflict-affected areas have low levels of knowledge about condom use. When knowledge is low, that means mass media campaigns have failed, as have formal education, literacy and clinic-based education activities. People know that AIDS is a threat to their health, but they do not know how to prevent it (condom use,

monogamy) (Mock et al., 2004).

Zambia has significant sexual health issues, including HIV/AIDS, family planning, and reproductive health. Health officials decided to confront them with social marketing and health communication programs. These programs focus on reproductive and HIV/AIDS prevention programs. Van Rossem and Meekers (2007) explain the programs and assess their impact on condom use. Radio and television programs about family planning and HIV/AIDS and about communications about the socially marketed Maximum condoms are broadcast in Zambia. The researchers use data from the 2001-2002 Zambia Demographic and Health Survey. Their goal is to estimate the effect of program exposure on the behavioral outcomes. They found that those who were exposed to radio and television programs about family planning and HIV/AIDS were more likely to have ever used a condom. “Men highly exposed to Maximum condoms social marketing communication were more likely than those with low exposure to the program to have ever used a condom, and to have used a condom at their last sexual intercourse” (Van Rossem and Meekers). They conclude that reproductive health and social marketing campaigns in Zambia connected with many Zambians and significantly increased condom use. They suggest that future reproductive health communication campaigns that invest in radio programming might be more effective than those investing in television programming, and that future condom campaigns should focus on women (Van Rossem and Meekers).

Researchers in Cameroon were seeking to educate youth about sexuality. The 100% Jeune youth social marketing program focuses on the high STI/HIV prevalence rates and the high levels of unwanted pregnancy in that African country. Plautz and Meekers (2007) analyzed the 100% Jeune program, evaluating its reach, whether it increased condom use, whether it led to less sexual activity, and predictors of condom use. Studying trends in data over a 36-month study period showed that “substantial

positive changes occurred among youth” (Plautz and Meekers). They concluded that some of the change could be attributed to the 100% Jeune youth social marketing program. “The program contributed to substantial increases in condom use, including consistent use with regular partners among youth of both sexes.” Males became more likely to consistently use condoms with sexual partners. Condom use increased more with casual partners than with regular partners although it increased with both. The 100% Jeune program however had no effect on increasing abstinence or limiting numbers of sexual partners. There also was no evidence that “reproductive health programs for youth lead to increased sexual activity” (Plautz and Meekers).

Malaria in Tanzania

Many malaria episodes in highly endemic countries are not treated as quickly as they could or should be. This is because some health workers face obstacles in patient homes as well as from national health ministries. Access to malaria treatment also can be hampered by public health policies. One example is Tanzania, where the ACCESS Programme is one solution to that problem. The goal of ACCESS is “understanding and improving access to prompt and effective” malaria treatment and care in a rural setting. Health promoters used road shows to disseminate behavior change messages that were designed for a poor, rural audience. At road shows, the platform of a truck was used as a mobile stage. The shows include dancing competitions, role playing portraying appropriate treatment, public lecture on malaria transmission, signs and symptoms, dangers of malaria for young children and pregnant women, and prevention and correct treatment, and a film featuring stories on prompt and effective malaria treatment. Road shows were well attended. Some 39 percent of respondents to one survey indicated that they had attended an ACCESS road show. Men were more likely to attend than women and younger people were more likely to attend than older people. The survey also indicated that

numerous people had seen promotion materials. These included T-shirts and caps, a vehicle displaying ACCESS slogans and billboards (Hetzl et al., 2007).

Tuberculosis in Africa

Bridges.org is a non-profit organization that was founded in Washington, D.C. and has offices in Uganda and South Africa. Many of its programs are under way in East and Southern Africa, but “much of our work is broadly applicable — and noticed and learned from — across the developing world” (Vietnam.net Bridges, 2008). On Cue is a firm based in Cape Town, South Africa that sends Short Message Service (SMS) messages to patients via mobile telephone, to help them remember when it is time to take their tuberculosis medicine. Bridges conducted a study to determine the usefulness of On Cue’s program. Researchers used data from patient records, background documents and reports, clinic visits, and structured interviews of patients and staff through the use of questionnaires. Researchers conducted surveys of patient satisfaction with the compliance service and also health worker satisfaction with the service. They determined that patients and health workers both approve of the service. Users were able to use the cellular technology correctly. However, it also was determined that “a significant number of patients interviewed” were not using the service as they were instructed to (Vietnam.net Bridges).

Adolescent Health in Africa

The Health Communication Partnership (HCP) is a global communication initiative based at The Johns Hopkins Bloomberg School of Public Health/Center for Communication Programs (CCP) in partnership with these organizations: the Academy for Educational Development, Save the Children, the International HIV/AIDS Alliance, and Tulane University’s School of Public Health and Tropical

Medicine. One paper on the HCP Web site demonstrates how health information is sometimes directed toward children, showing that education is a key element of health communication. In Uganda, a “newspaper magazine” called *Young Talk*, owned by the Straight Talk Foundation, promotes programs designed to influence “primary behavior development and behavior change among adolescents” who are susceptible to HIV and AIDS (United Nations International Children's Emergency Fund and Johns Hopkins, 2000). The foundation also uses other print materials, radio programs and school-based initiatives. A 2000 survey (n=1,380 children in upper primary school) showed that 83 percent had read *Young Talk* and that 23 percent of respondents drew Sara, a cartoon character in *Young Talk*, as they recalled things from the magazine, leading the researchers to conclude “Sara continues to be a very popular children’s educational comic strip, especially for young adolescents. It was spontaneously identified by at least 1 out of 4 of the young adolescents surveyed” (United Nations International Children's Emergency Fund and Johns Hopkins).

Health in Asia

As low-income countries in Asia gain more financial independence from developed countries, their workers seek more rights. Quality of life in the workplace then becomes a more important issue than before. Rusli, Edimansyah and Lin (2008) surveyed male automotive assembly workers in Malaysia (n=698) to study the relationships between working conditions (job demand, job control and social support), stress, anxiety, and depression. Perceived quality of life factors (physical health, psychological wellbeing, social relationships and environmental conditions) also were assessed. These researchers reached three conclusions: workers who received higher social support had higher self-reported quality of life; social relationships are increased by higher job control; and higher job demand results in more self-perceived stress and decreased self-perceived quality of life “related to

environmental factors” (Rusli, Edimansyah and Lin).

Nutrition and Hepatitis in Asia

In June of 2006 the Tonga Broadcasting Corporation completed a series of “hard-hitting” radio and TV programs on poverty and possible solutions in Tonga. The United Nations Educational Scientific and Cultural Organization’s (UNESCO’s) International Programme for the Development of Communications funded the project. Programs aired on the TBC radio and TV networks. The format included interviews and research surveys resulting in 10 30-minute programs in the Tongan language. They informed Tongans about current development projects — including food security and health. Citizen input was sought (United Nations Educational Scientific and Cultural Organization, 2006). One of the most common problems for health workers tracking and curing infectious disease is that — despite immigration restrictions — sick people still do travel. For example researchers in the United Kingdom surveyed 117 Chinese residents and 234 non-Chinese resident controls and discovered that 12.8 percent of the Chinese and 0.4 percent of the non-Chinese residents were HBsAg positive persons (Ching-Chiang, 2008).

Reproductive Health in Asia

The Bangladesh Center for Communication Programs and the Bangladeshi Adolescents Reproductive Health Working Group partnered in 2002 to create a multimedia interactive toolkit for youth educators. It focused on four areas: 1) physical and emotional changes; 2) sexuality, sexual attraction and delay of sexual debut; 3) preventing HIV and other sexually transmitted infections (STIs); and 4) preparing for marriage. Two surveys of adolescents and their parents in both the intervention sites and selected comparison sites were part of the pilot study. Researchers conducted these surveys to

“measure the changes in reproductive health-related knowledge, attitudes and behaviors resulting from the pilot intervention” (AC Nielsen Bangladesh, 2006). In the first survey (n=1,702 adolescents between the ages of 13 and 19 years and n=1,203 parents) interviews were conducted between February and March 2004. In the second survey (n=1,827 adolescents and n=1,276 parents) interviews were conducted between June and July 2005. Respondents’ radio use was found to be higher in 2005 than in 2004. Some 32 percent of adolescents reported listening to the radio every day in 2005, compared to 29 percent of adolescents in 2004. Researchers also found that adolescents from the intervention areas were slightly more likely than adolescents in the comparison areas (33 percent to 29 percent) to listen to the radio every day. More males than females listened to the radio while more people listened at home (59 percent), than at neighbors’ houses (25 percent) or relatives’ houses (10 percent) (ACNielsen Bangladesh).

Malaria in Asia

Researchers have made “substantial progress in the battle against malaria worldwide during the 2000s, but it remains “a major global problem” (World Health Organization, 2005). Education of young people about the disease is seen as one way to increase what they know about it, how they feel about it and what they do to control it in their lives. Nonaka et al. (2007) were interested in learning what effect a malaria education program would have on communities in low-income countries. They concluded that school children could act as health information messengers from schools to communities for malaria control in Lao People’s Democratic Republic. These researchers conducted a school-based intervention in Oudomxay province, Lao PDR, and compared scores obtained before and after the intervention. Among the participants were children in grades 3-5 (n=130) at two primary schools, their guardians (n=103) and married women who did not have children in the target grades (n=130). The intervention

was twofold. The first part was presentation of a flipchart at home. Part 2 was a 1-day campaign conducted by the school children and aimed at the community. The flipchart presentation was conducted at villages where school children of both primary schools resided. However, the 1-day campaign was conducted only at one village. Prior to and after the intervention, researchers surveyed community women about malaria. Their primary finding was that, in married women without children in the target grades, particularly those who were presented with the flipchart and who participated in the campaign, the scores of the mean knowledge, attitudes and practices were significantly increased 1 month after the intervention (Nonaka et al.).

Smoking in Asia

Researchers in Pakistan wanted to know what causes tobacco use in that country. Are there socio-economic and demographic factors? They conducted a cross-sectional survey of males and females 18-65 years of age (n=2,018) in households in Rawalpindi. Primary data they sought was self reported daily tobacco use. Some 16.5 percent of the study population (33 percent of men and 4.7 percent of women) reported using tobacco on a daily basis. Some were cigarette smokers (68.5 percent). Others took tobacco orally (13.5 percent). Other modes included hukka pipes (12 percent) and cigarette smoking plus oral tobacco (6 percent). Some 56 percent of non-tobacco users had been exposed to “environmental tobacco smoke.” The researchers concluded that there was a “positive association between tobacco use and rural area of residence, male gender and low education levels. Low education could be a proxy for low awareness and consumer information on tobacco products” (Alam & Talha, 2005).

Smoking in Europe

Do mothers and fathers who stop smoking when the female partner becomes pregnant start smoking again later? How does this affect the child? Puig et al. (2008) studied differences in environmental tobacco smoke at the end of pregnancy and at 4 years of age by encouraging self-report by parents and by measuring cotinine (a metabolite of nicotine) in the babies' urine. They surveyed the mothers of 487 infants from Barcelona city in Spain, asking about their smoking habits. They found that at age 4, the median urinary cotinine level in children increased 1.4 times when the father smoked, 3.5 times when the mother smoked. Cotinine levels in children's urine statistically differentiated both the children whose mothers smoked, and children who come from exposed homes, from children from non-exposed homes. Further, self-reported maternal ETS exposure in homes declined during the four-year span, from 42.2 percent to 31 percent. Nevertheless, most of the children who were considered non-exposed by their mothers actually had detectable levels of cotinine (above 1 ng/mL) in their urine (Puig et al.).

Web Developer Surveys

If a person needs information in 2008, where does she turn? In many cases she turns to the World Wide Web. According to Internet World (2008b), more than 1.57 billion people — nearly 22 percent of the world's population — use the Internet. While many of the pages on each Web domain are similar in design to the others on that domain, a large number of pages were dreamed up, thought out and processed separately by Web developers. Were these developers using established best practices? Were they considering the intricacies and idiosyncrasies of the subject matter? Did they strive to provide accurate content in an ethical manner? Did they consider the needs of their audience? Did they match their vision for this communication process with both their available technology and that available to the

users of their Web pages? If a Web developer's behavior is his act of building a Web site, what are his attitudes toward Web development? What is his knowledge level?

Meanwhile, others are asking questions of Web developers. Who are these developers and what are their needs? What problems do they have? What processes do they follow? What tools do they use? These are some of the questions asked by Rosson, Ballin, Rode & Toward (2005) in a survey of more than 300 Web developers. These researchers' findings relate to process, tools, quality control and learning. They called the "prototypical" programmer in their sample "meticulous" about the quality of his work. He cares about usability issues but not about accessibility, the process by which disabled people can access computers and the Internet. Web developers in this survey claim many similar interests, such as authentication, databases, online surveys or forms, and other Web features. While a Web developers' primary role is to make a Web site that is a tool that is easy for others to use, Web developers want their site-building tools — the tools of their craft — to be simple as well. They also are interested in the ability to integrate multiple tools and prefer strong code editing features, or WYSIWYG (What You See Is What You Get) capability (Rosson, Ballin, Rode & Toward). Web developers' attitudes toward detail work were one focus of the survey.

Our respondents tended to agree with the statement: I spend a lot of time making sure my site's layout, formatting, content, and interactive elements are just right before I 'go live' (mean=4.18, SD=0.93, n=274). They voice similarly strong agreement with: After my websites 'go live', I check back frequently to make sure that everything works like it should (links, images, forms, etc.) (mean=4.11, SD=1.0, n=274). These responses suggest that attention to [detail] ... is high on these developers' list of concerns (Rosson, Ballin, Rode & Toward).

Rosson and Kase (2006) looked at whether Web developers consider their Web activity to be work or non-work. An online survey on Web development practices and attitudes was undertaken (n=504). The survey included six categories: Web development activities; development tools; development issues; technology background; personal working style and general background. Among their findings: developers who use the Web for work are generally more sophisticated than non-work developers (hobbyists); and work developers claim to be more attentive to design issues and to testing. The authors say one could read their findings and “dismiss the challenges of non-work developers.” But they argue that non-work developers have a vital role on the Web, such as helping to run online communities (Rosson and Kase).

Some Web developer surveys seek to determine what “type” of developer a developer is. An example is a 15-item Elektron-Sitepoint survey (n=4,526). As they studied the data they found that respondents fall into four groups: The Guru, the Entrepreneur, the Designer and the Corporate. Gurus are exacting. They seek excellence in their work. They look for trends and want to employ them to make their Web sites better. For them, the technology or distribution method is the key. The Entrepreneur cares more about generating an audience (customers) for her work than the technology or distribution method she employs. The newness of technologies does not impress her. The Designer is concerned about satisfying an existing audience with attractive sites that are delivered on time. The Corporate is “strongly motivated toward reliable, stable performance” (Langmaid, 2006). It is conceivable for an office of Web developers to employ one or more of each of these types of Web developers. In many cases it would be beneficial to have a mix on a team. Although disagreements may occur, the give and take would be helpful. It also is possible for a single individual to have characteristics of several types, or for him to evolve from one type of developer to another during his career.

One of the areas of interest was server platform. Results showed that 68 percent of these Web developers develop for PHP (a computer scripting language) among other server platforms, and 33 percent reported they develop only for PHP. Other results: 40 percent use Dreamweaver as their primary development environment while 46 percent were planning to introduce AJAX technology into their Web projects “over the next twelve months” (Langmaid). Some 24 percent expected to start developing for Ruby on Rails in the next 12 months, but only eight percent expected to start using Python. Finally, 37 percent mostly used a homegrown content management system, which is more than the combined number of those who used commercial (11 percent) or open source (24 percent) CMS tools.

A large survey of Web developers was released in April 2007. The sample of nearly 33,000 people asked 37 questions about the “business of web design and development, both in the United States and across the world. It was found that some 70 percent of respondents earn less than \$60,000 per year. Gender bias does not play a role in salary. It also was found that more than 70 percent of Web workers post to a blog (A List Apart, 2007). This survey includes sections about Web developers’ demographics, educational backgrounds, employers, salaries, jobs and titles, continuing education and skill gaps. For the latter category, 81 percent of respondents indicated that HTML and XHTML markup skills are necessary to do their jobs. Some 78 percent indicated that back-end development skills (PHP, ASP) are necessary. More than 77 percent said Cascading Style Sheets (CSS) coding skills are vital. Some 75.9 percent mentioned front-end programming (such as Java script) while 75.7 percent mentioned page layout and interface design skills. Graphic design skills were mentioned by 72.5 percent of the respondents (A List Apart).

Finally, Getty Images (2007) sponsored a reader survey (mostly graphic designers). It was found that more than half of the respondents were engaged in ongoing Web site maintenance (61 percent) and

new creative design (51 percent). Half (50 percent) were engaged in e-mail marketing campaigns. Some 43 percent listed the upgrading of current sites as a work activity. Other categories listed included Web site programming (41 percent), dismantling discontinued sites (38 percent), E-commerce set-up (22 percent), generating content for video/mobile media (17 percent) and game design (4 percent). How much of their time do respondents spend on Web design? They answered: Up to one quarter of their time (39 percent), one quarter to one half (35 percent), one half to three quarters (16 percent) and three quarters or more (10 percent).

Part III: Technology in Low Income Countries

Governments, educators, businesses, non-governmental organizations and individuals all face enormous obstacles in their efforts to bring information and communication technologies (ICT) to low-income countries. The primary obstacle is cost. “The high cost of computer hardware in Africa has a major impact on the continent’s ability to improve networked readiness, as this cost is often the largest component of network startup budgets,” El-Sobky (2004) writes. And yet many believe that ICTs are a “new social and economic force in the world economy” (Moyo, 1996).

Governments play the primary role in building a low-income country’s technical infrastructure. Obstacles to e-learning in low-income countries are due to a lack of infrastructure, plus poor leadership, the scarcity of local content, copyright issues, cultural challenges and the roles of instructors and learners (El-Sobky). Businesses often are slow to adopt new technologies because to do so requires outlays of cash that are earmarked for other purposes. Non-governmental organizations (NGO) have great ideas, and dream a lot, but often are cash-poor. Individuals, living on extremely low wages, often without electricity, are likely not to adopt technology in their homes. And yet technological

advancements are made — somehow — under the most difficult of circumstances. In 1996, during the age of the nascent World Wide Web, there were several success stories in the African IT community, most notably banking in Nigeria, air travel in Zimbabwe, software development in Mauritius, and “the development of the HealthNet network in many African countries” (Moyo). But not all sectors and all low-income countries are making progress, even now in 2009.

For the Essential Health Links Web site in this research to accomplish its mission regarding low-income countries, many things must happen. Chiefly, the Web sites linked off this gateway must be published online in a manner that is technologically consistent with Internet-ready computers in Africa, Asia, and Latin America. But how can one source-country programmer (or a team thereof) determine the optimal manner in which to build and post a site? The programmer(s) must decide to build the site so that as many people as possible can access it without technical difficulty. With the technology of the Internet changing almost monthly, this is not an easy task. New Web technologies are enticing, but they can serve only to increase the difficulty with which a health worker in Africa, Asia or Latin America accesses the World Wide Web. Developers must achieve the lowest-common denominator in programming.

In 1996, Internet modems in the United States had download speeds that ranged from 14.4 to 28.8 kilobytes per second. Today, cable modems in the United States boast speeds of up to 6 megabytes per second. Residents of low-income countries who use — or seek to use — the Internet no doubt seek newer hardware, better software and faster, inexpensive access speeds. But who will deliver them and how will they be delivered? These questions are the focus of this portion of the literature review.

Internet Access

By 2000, all 54 African countries and territories had public Internet access in their capital cities (Jensen, 2000). Thirty countries had access in secondary towns and 19 had nationwide access. Three countries — Egypt, Uganda and Kenya — had what is euphemistically known as “free” Internet access. Customers pay for it when they pay their phone bills. Six countries had local Internet exchange (peering points): Egypt, Ghana, Kenya, Mozambique, South Africa and Uganda. (Jensen).

Five countries had public Internet access at their airports, including Cameroon, Kenya, Nigeria, South Africa and Zimbabwe. Six countries had hotels with in-room Internet access, including Egypt, Ghana, Mozambique, Nigeria, South Africa and Tanzania. More than 30 countries had GSM mobile phone international roaming. Five countries had national, online E-commerce trade sites: Egypt, Ethiopia, Morocco, South Africa and Tunisia. The stock exchanges of seven African countries were on the Internet: Egypt, Ghana, Kenya, Mauritius, Morocco, Namibia and South Africa. More than a dozen African countries had radio stations that broadcast on the Internet, while four had Webcams — Egypt, Nigeria, Seychelles and South Africa (Jensen, 2000). Six years later, access had increased, but the Internet still was suffering problems in Africa (Jensen, 2006): The majority of African countries had not yet connected to global fiber backbones, which is unfortunate because optic fiber is said to be “the only way” for low-income countries around the world to access low-cost bandwidth. The fiber that has been installed was not done so at competitive prices and business models favor the corporations over the users. For example, a “cable planned for the East coast of Africa (EASSy) which will have a major impact on bandwidth availability in the region, was being developed as a club of mostly state monopoly operators with high prices and low volumes in mind” (Jensen, 2006).

Low Budget Computers

Several organizations are taking the lead in an effort to bring computer hardware and thus Internet connectivity to some of the hardest-to-reach regions of low-income countries. Their goal is “wiring” the youngest generation. With the backing of large companies such as Google, Nicholas Negroponte, founding director of The Media Lab at Massachusetts Institute of Technology, embarked on a project called One Laptop per Child, which hopes to provide low-end laptop computers to people in low-income countries. The key element of this effort is the creation of a laptop that will cost only \$100. They hope governments will “buy them in bulk and turn them over to children who live even in the poorest, most remote areas of the Third World” (Nocera, 2006).

If Negroponte gets his wish, and there someday are hundreds of millions of these machines around the world, it will likely change the way children learn, Nocera writes. But it also will radically change the landscape for computer hardware in general in low-income countries. In Ivory Coast, an affluent West African country (compared to its neighbors), a personal computer cost about \$1,000 in 2002. That is considerably higher than the annual per capita income in a country where the minimum monthly wage is \$40 (Reuters, 2007).

Negroponte’s plan was to sell one million laptops — powered by Advanced Micro Devices (AMD) chips — each to governments in seven countries. They were to be manufactured by Quanta Computer. The initial cost was to be \$135 per unit (in March 2007), dropping down to \$50 by 2010. Interestingly, because these computers will be used in areas with little or no electricity, crank handles may power them. Negroponte has critics, most notably executives from Microsoft and Intel, both of whom were being left out of a deal that could turn the worldwide market share for computers upside down. Said Bill Gates, chairman of Microsoft, “Geez, get a decent computer where you can actually

read the text and you are not sitting there cranking the thing while you are trying to type.” The chairman of Intel’s board, Craig R. Barrett, called Negroponte’s laptop a “\$100 gadget” (Nocera). Both have much to lose financially if this project is successful.

The notion of a \$100 computer brought to the forefront the question of what applications should be included in a computer used by people in low-income countries, where access to the Internet, technologically-savvy people (for training and maintenance), and even electricity, are often limited. What kinds of computer hardware and software should be implemented? How shall the connectivity be established: telephone lines, coaxial cable, satellite feeds? Each situation is different and calls for a different solution. These questions are being asked in a low-income world even as, through 2001, less than half of the people in the world had made a telephone call; and significantly fewer had used the Internet. Researchers call this the “digital divide.” (Jensen & Esterhuysen, 2001).

Rural Telecentres

One way that low-income countries can narrow the digital divide between people in urban areas, who have access to the Internet, and people in rural areas, who may not, is through the introduction of rural telecentres. These centres, which can be founded as either public or private enterprises, often include telephones, facsimile machines, computers with Internet access, printers and other hardware. (Some of these facilities also are used as community centers, police stations or health clinics.) Telecentres often are established and maintained by governments, non-profit organizations (NGO) or entrepreneurs. They have been opened as private enterprises in countries such as Ghana, Kenya and Senegal, but they also have been funded by organizations such as UNESCO, the International Telecommunication Union (ITU), the IDRC and a number of other international development agencies (Jensen and Esterhuysen), serving mostly an urban clientele.

Disadvantages of Telecentres

Comparing decentralized computer projects like One Computer Per Child (OCPC) with centralized telecentres, one sees disadvantages to both: Projects like One Computer Per Child can suffer from poor user technical skills and lack good user training. Meanwhile, telecentres can offer training. Telecentre officials can finance hardware by charging users nominal fees. But use of the OCPC devices has advantages over telecentres. The most obvious is that users can take their laptops with them wherever they go; most importantly they can be taken home. Further, a technical problem at a telecentre might shut down all of the computers in the facility whereas a problem involving a single machine affects only that machine. To expand on this point, Jensen and Esterhuysen list a number of potential telecentre problems: 1) Computer hardware breaks down; 2) Technical assistance is unreliable; 3) Too many or too few customers; 4) Schedule of open hours is not designed to meet the needs of users; 5) Delay or loss of funding; 6) Unreliability of volunteers or paid employees and trainers; 7) Conditions of the telecentre, as it may be too small, too hot or too cold; 8) There may be too many programs scheduled for a small staff to maintain; 9) Staff may have poor customer-service skills; 10) Connections to networks or the Internet may be unreliable on either end; and 11) Users may refuse to follow rules of the centre (Jensen and Esterhuysen).

These authors use the word “unreliable” to describe power supplies (twice), technical assistance, volunteers, telecommunications connections and manual, operated-connected calling. Finally, telecentres in low-income countries, which house equipment valued at thousands of dollars, must be made safe from the threat of burglary as well as safe from the threat of natural disasters. While the cost of using the equipment can be kept low over time, most telecentres cannot budget to replace hardware and software that wears out before it should. If people in low-income, oral cultures are going to leapfrog

over books to computers, their hardware must be maintained properly.

Operating Systems

One question addressed by Nocera is that of which operating system should be used in the \$100 machines. In a world where most computers — and tens of millions of people — use Microsoft operating systems every day, Negroponte's machines were originally developed with Linux free, open-source operating software. This effort is not a rare case, however. Across the world low-income countries are opting to use Linux rather than Microsoft. The Cuban government, for example, chose Linux in 2005. Others include Brazil, India, South Africa, China, Russia and South Korea. And there are more. They are choosing Linux for several reasons. 1) It is perceived to be less expensive; 2) For political reasons. People in countries that officially disapprove of the American government wish not to be associated with American companies such as Microsoft (Pickoff-White, 2005).

Bandwidth

Aside from increasing the number of low-cost computers, and choosing the right operating system for those computers, low-income countries must also increase the bandwidth with which they operate those computers on the Internet. If a computer is like a car on a highway, and the operating system is the car's engine, then bandwidth is the highway itself. How fast the car operates depends chiefly on how smooth a ride it gets on the road. Is it a two-lane dirt road or the Autobahn? How fast a computer operates depends a great deal on the amount of bandwidth with which it is allowed to operate. Like highways, bandwidth is not cheap. In a report he conducted for the Partnership for Higher Education in Africa, Jensen (2003) calculated that Makerere University paid approximately \$22,000/month for 1.5 Mbps/768 Kbps (in/out) while the University of Ghana paid \$10,000/month for 1

Mbps/512 Kbps. Jensen concluded that African universities outside of South Africa were paying more than \$55,000/month for 4 Mbps inbound and 2 Mbps outbound. “These figures are about 100 times more expensive than equivalent prices in North America or Europe” (Jensen). Costly satellites, rather than cables, are the primary vehicles for transmission.

The INASP report states that governments could control costs and improve access by opening their telecom markets to competition; academic institutions could work together to negotiate lower bandwidth charges from telecoms and local ISPs could set up Internet exchange points — that route Internet traffic within that country rather than through Europe and North America. INASP also promoted the use of open source software. But as Jensen states, INASP also advocates “a different approach” that emphasizes a caretaker philosophy.

An alternative response is to recognise that ‘bandwidth’ is a valuable institutional resource or asset that needs to be managed, conserved, and shared as effectively as possible. Instead of simply extending computer and network infrastructure, or finding cheaper providers, this approach puts emphasis on ways to control and manage the many hungry Internet applications, uses, and practices that consume bandwidth. Such an approach has technical implications regarding network configuration and management. Suitable policies and guidelines are also needed to encourage proper bandwidth saving behaviour. Most critical, it requires that people with the necessary technical expertise and understanding of users’ needs are available to the organisation (Jensen, 2003).

Thus studying how bandwidth is used and then using it more wisely are options when access to low-price bandwidth is not possible.

50 Percent by 2015

In addition to working on the One Laptop Per Child project, the chipmaker AMD also is involved in an initiative to give Internet access to 50 percent of the 6 billion people in the world by 2015. (Advanced Micro Devices, 2008a). The company is working on the assumption that the world's population will be 7.2 billion in 2015. Since January of 2004, AMD has announced business relationships with public and private partners in India, China, Russia, Jamaica, Brazil, Ethiopia, South Africa, Turkey, Mexico and countries in Central America. The company even shipped 400 Personal Internet Communicators to Louisiana, Mississippi and Texas to help evacuees contact friends and family in the wake of Hurricane Katrina (Advanced Micro Devices, 2008b).

Personal Internet Communicators are devices designed by AMD and sold by Radio Shack for \$299. They run on AMD's 366 MHz (low power) Geode GX processor and the Windows CE operating system and are designed to allow users to access the Internet and do basic computing (Duncan, 2005). These machines, which are designed to be supported by a local Internet service provider, include keyboard, mouse, and a pre-installed software suite for "communications, entertainment, and education applications that give users improved communications and opportunities for furthering education" (Advanced Micro Devices, 2008c).

AMD's PIC is not universally supported. One respondent to a Digital Trends bulletin board wrote: "eh..i love AMD and all but \$299 that is pretty expensive for a barebones comp with no memory and old processor. now a days you can get refurb AMD Athlon 64 from emachine for \$399. They should be doing what MIT is doing and creating sub \$100 laptop's," Andrew wrote (Duncan, 2005). Andrew's comment supports low prices but he likely does not have the unique and broad perspective of someone who lives in a low-income country.

Other Projects

Intel

Intel introduced WiMAX, which was described as a “rugged” PC for use in low-income countries, at its developer forum in August of 2005. Developers designed this wireless machine to be functional in harsh climates; to work during periods of intermittent electricity (via car battery) and to co-exist in an environment caked in dust and overrun by bugs, “allowing for far flung villagers and mystical Indian hermits to access the Internet from their communities” (Magee, 2005). Intel (2008) describes its “World Ahead Program as “a comprehensive initiative that aims to enhance lives by accelerating access to uncompromised technology for everyone, anywhere in the world by advancing accessibility, connectivity, and education.” The company hopes to invest more than \$1 billion into this project through 2010. Its main goals are to enable wireless broadband PC access for “the world’s next billion users” while simultaneously training some 10 million teachers how to utilize technology in education. With this accomplished, they say those teachers could impact one billion students.

Microsoft

Bill Gates, the Microsoft chairman, announced a partnership with the United Nations to bring computer technology and literacy to low-income countries, in January of 2004. Gates’ company was to create a \$1 billion fund and “work with the United Nations Development Program to provide software, computer training and cash to establish computer centres in poor communities” (Australian Associated Press, 2004). Their pilot projects were to be in Egypt, Mozambique and Morocco. Gates made the announcement at a news conference at the World Economic Forum. He said the centres would be equipped with more than just Microsoft products, but he added that his company would support use of software that “is quite popular and happens to belong to Microsoft” (Australian Associated Press, 2004).

Representatives from low-income countries welcomed the project. Ahmed Mahmoud Nazif, Egypt's minister of communication and information technology, said that some 500 to 600 centres already had been established in Egypt, and the Microsoft aid supports that effort. "The problem is, it's not just the computers and the phone lines that you need," he said. "It's what's behind that," referring to technical support. Mark Malloch Brown, a representative of the United Nations, saw this project as a way to "provide poor communities access to information and services" while simultaneously bypassing "corrupt" governments (Australian Associated Press).

Power

Where electricity is not available, how will computers be powered? Some computers in low-income countries are powered by solar energy. Negroponte designed his computers to be powered with a crank or a pedal. Wind-up computers seem like a novel idea but when one considers that clocks have been wound for centuries, it is not such a new idea after all. Wind-up computers were first introduced into low-income countries during the 1990s. British inventor Trevor Baylis connected a spring generator to an Apple Newton eMate 300, a small computer, in 1997, in front of the conference of Commonwealth Education Ministers in Botswana. One minute of winding resulted in 14 minutes of computer usage (Freeplayenergy.com, 2001). But Negroponte's machines lack both a hard drive and optional software. This, in addition to the need for winding, has resulted in the project being further derided by Bill Gates. At the Government Leaders Forum in 2006 in suburban Washington, D.C., Gates stated that shared-use computers should not be without disks of some type, and their screens should be larger (Techshout.com). Early personal computers and Apple computers had small screens. Gates would like people in low-income countries to start their computing capabilities at a higher end than Negroponte wants, but that may not be financially feasible.

HealthNet and Uganda

Technology provided by the Academy for Educational Development/SATELLIFE enables health care professionals to participate in global “electronic conferences.” Subscribers receive hard-to-obtain medical information such as library bulletins and publications. An electronic publication published by AED/SATELLIFE “summarizes the latest medical research relevant to the developing world.” Additionally, indirect access to databases in the U.S. National Library of Medicine is provided to subscribers (International Development Research Center 1998, March).

IDRC makes the bold claim that HealthNet “saves lives,” particularly in isolated areas. The author cites an example wherein a physician in Zambia was caring for a patient with “an unusual condition.” The physician used HealthNet to e-mail colleagues at a Zambian teaching hospital. His colleagues replied with a treatment that enabled the patient to recover without making the arduous trip to the city where the hospital is located. Meanwhile, at the Muhimbili Medical Centre in Dar es Salaam, Tanzania, physicians stymied the death rate among pediatric burn patients with the help of HealthNet. Again the technology or distribution method was e-mail. It enabled doctors at the center to share data with their colleagues, including specialists and health organizations worldwide. Free shipments of a drug that helps heal burns and relieves pain were sent by at least one correspondent.

Through AED/SATELLIFE, HealthNet links libraries in low-income countries in southern Africa with those in the developed north. Among the benefits: north officials train south librarians and provide full-text and summarized articles. Over the past few decades Africa has experienced a variety of epidemics, from HIV to malaria to cholera. HealthNet enables health workers to access health information quickly during an epidemic. AED/SATELLIFE has an electronic conferencing system

called ProMED, which includes monitored e-mail discussion groups. HealthNet is affordable for most health workers and the organizations they work for.

IDRC also has been involved in Uganda, which has experienced deadly epidemics of cholera, malaria and HIV/AIDS. The organization's plan was to "link Mulago Referral Hospital with rural hospitals and clinics, telecentres, and medical research institutions in Canada and other foreign countries" (International Development Research Center, 2005, June). Access would be through a high-speed local area network. This would benefit medical students and health workers. It also would benefit local and rural hospitals, as faculty and hospital staff would be able to provide them with valuable medical information. Researchers were keenly interested in the effectiveness of the "mechanism" or delivery technology in this project (International Development Research Center, 2005, June).

Part IV: Communication Theory

Whether using a PDA in the Philippines or the Internet in Vietnam, the result is a communicative act. In the classroom, on the battlefield or in the corporate office, communication is one of the most basic acts human beings perform together. Communication helps people form bonds in families, on sports teams and in the workplace. Successful communication can help people climb mountains. Unsuccessful communication can cause wars. Successful communication is essential in business. The average U.S. office worker receives about 190 messages per day (Wetmore, 2002). Thus finding ways to spread successful communication is vital. There are several types of communication. Lane (2000) looks at these communication types in terms of the context of the communication (i.e., the environment in which the communication takes place). He divides communication primarily into general context and applied context.

The general context refers to types of communication that are defined by the audience, or the number and types of people participating. These include societal (public, mass, intercultural and intracultural), organizational, group, interpersonal and intrapersonal. Communication may simultaneously be both interpersonal and intercultural, but is not likely to be both intercultural and intracultural at the same time. The audience as defined by Lane is analogous to the audience in the model introduced in this dissertation. General communication should be pondered in terms of the sender and the receiver of the communicative act or message. Barton (2005) looks at the most common of these general communication types (interpersonal, intrapersonal, group and mass), but he also looks at extrapersonal communication, which he defines as “communication between machines.”

The applied context of communication refers to categories that are defined by the function of the communicative act. According to Lane, these include health, education, intimate, legal, family and political communication, as well as consumer behavior and public opinion research. There are many others. Applied communication should be considered as analogous to “subject matter” in the model introduced in this dissertation.

Seminal Communication Theories

As stated above, the people involved in a communicative act are the sender and the receiver. Both have knowledge of and attitudes about the subject matter being communicated. The message itself represents the behavior of the sender and the receiver (the latter being through feedback), because in sending their messages these two entities are performing acts. The roles of the sender and receiver have been eloquently portrayed in words and visual models over the past 60 years. During that time a number of scholars have proposed theories and models of the overall communication process. Communication theories to be analyzed herein include those proposed by Lasswell, Shannon and Weaver, Gerbner,

Newcomb, Westley and MacLean, Jakobson, and Osgood and Schramm. The models that represent many of these theories also will be displayed.

Lasswell

According to Fiske (1990), Lasswell's 1948 model relates to how we understand the process of mass communication. It is stated this way:

Who

Says what

In which channel

To Whom

With what effect?

(Fiske, p. 30)

This is an example of persuasive communication and illustrates the importance of behavior to a communication model. The sender is sending the message hoping to persuade the receiver to behave in a certain way or at least to change his attitude toward a particular subject. At the very least he may have increased the receiver's knowledge of the subject matter.

Shannon and Weaver

Shannon and Weaver's *Mathematical Theory of Communication* (1964) is the basis for communication studies and information theory (Fiske, 1990, p. 6; Littlejohn, 1989, p. 42-46). As Figure 5 shows, this model holds that encoded information travels from a source (sender), through a transmitter,

along a signal and, despite noise, arrives at a destination (Shannon and Weaver, p. 34), where a receiver decodes it.

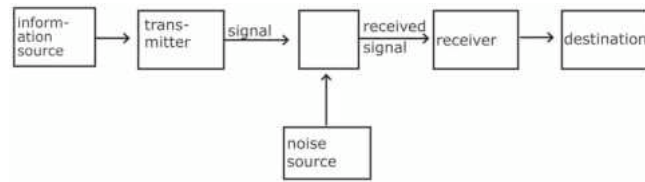


Figure 5. Shannon and Weaver's Information Theory Model

Copies of the model in subsequent texts, such as Littlejohn, also include a channel (1989, p. 44). Writing prior to the information age, Shannon and Weaver apply their model to telephony, telegraphy, oral speech, and radio (Shannon and Weaver, p. 7). This model shows communication to be a linear, one dimensional and top-down export of information that does not include feedback. But communication in the information age often is a non-linear exchange. Digital feedback frequently is referred to as interactivity and is accomplished several ways: 1) through increased — or decreased — viewing of pages on the World Wide Web by the original receiver. The act of not viewing a Web site is considered negative feedback. An increase or decrease in page views helps the site developer learn whether the site is effective; 2) The original receiver's decision to fill out online forms on a sender's Web site (or to purchase a product online); and 3) The volume and nature of the original receivers' e-mail responses to the sender. It is important to note that the feedback method for a Web site is the choice of the original sender, who sets up the receiver's options.

Other Information Theories

Gerbner

He elaborates on Shannon and Weaver's one-way model with a model that is more complex. But like that of his predecessors, it is linear (Fiske, p. 24). As Figure 6 shows, the basis of his model is that

“human perception is not a simple reception of stimuli, but is a process of interaction or negotiation” (p. 25).

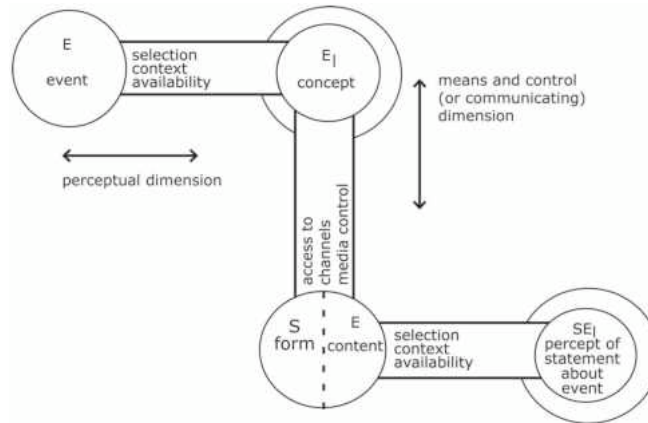


Figure 6. Gerbner's One-Way Model

Newcomb

He introduced a model of triangular shape (ABX) where A and B are the sender and receiver, respectively, and “X is part of their social environment” (p. 31). As Figure 7 shows, Newcomb's model includes: the positive or negative attitude of the sender A towards environment X; the positive or negative attitude of the sender A towards receiver B; the positive or negative attitude of the receiver B towards environment X; and the positive or negative attitude of the receiver B towards sender A. Fiske also refers to this as A's orientation toward X, as “an object to be approached or avoided (characterized by sign and intensity) and cognitive attributes (beliefs and cognitive structuring) (p. 31).

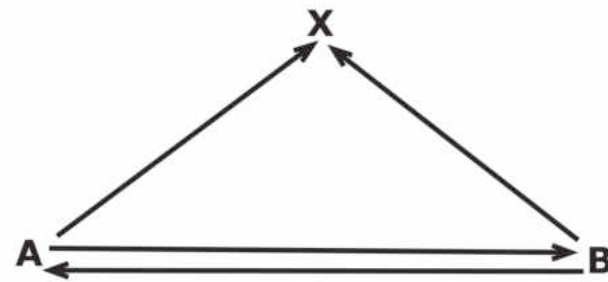


Figure 7. Newcomb's Triangular Model

Newcomb's model is the foundation for that of Westley and MacLean (p. 32). But, as Figure 8 shows, Westley and MacLean's mass media model incorporates two changes: 1) the editorial communication function, or C, is added. This is the "process of deciding what and how to communicate" (p. 33), which is synonymous with subject matter and technology or distribution method. Additionally, Westley and MacLean's model is linear in shape, like that of Shannon and Weaver (p. 33). But it includes feedback in three directions (p. 34).

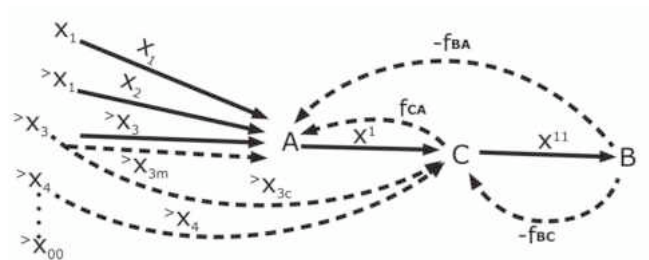


Figure 8. Westley and MacLean's Mass Media Model

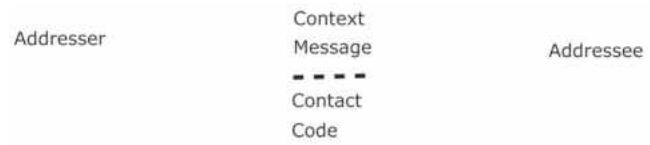


Figure 9. Jakobson's Model

Jakobson

His model has features of both linear and triangular models. As Figure 9 shows, it reflects his background as a linguist. This model refers to the addresser (sender), addressee (receiver), a message, context message (the context of the message) and contact code (the physical channel and psychological connection between the addressor and the addressee) (p. 35).

Osgood and Schramm

Feedback is vital. Underwood (2008) quotes Schramm as stating, "It is misleading to think of the communication process as starting somewhere and ending somewhere. It is really endless." As Figure 10 shows, a circular model by Osgood and Schramm includes an interpreter (the sender) who encodes messages and decodes feedback and an interpreter (receiver) who decodes messages and encodes feedback.

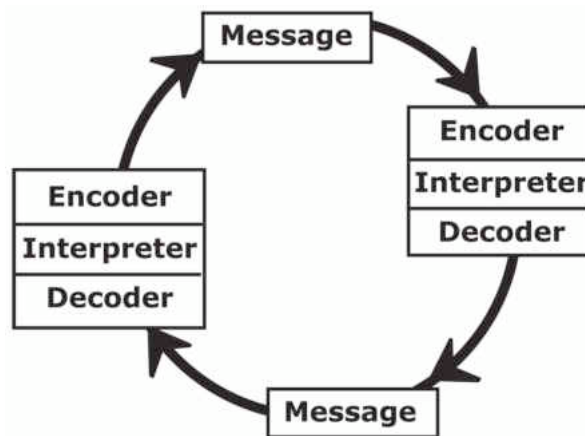


Figure 10. Osgood and Schramm's Model

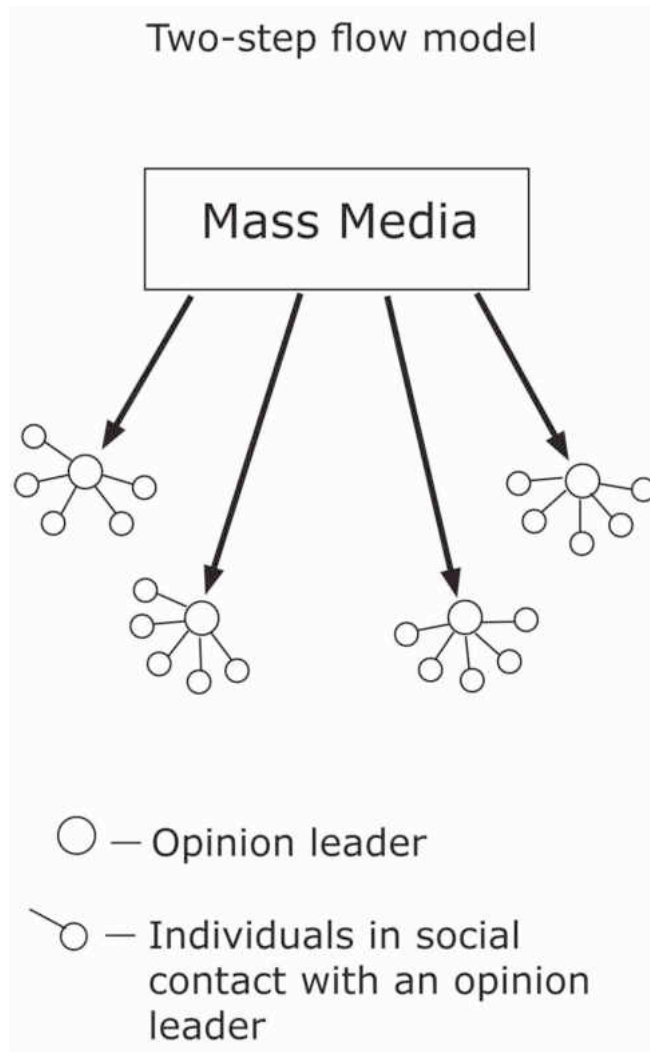


Figure 11. Katz and Lazarsfeld's Model

Katz and Lazarsfeld

They developed the two-step flow model. As Figure 11 shows, this model states that information from the media moves in two stages (Mersham and Skinner, 1999):

First, certain people who are heavy or regular users of the mass media receive the information.

Secondly, these people, called opinion leaders, pass the information along to others who are less exposed to the media, through informal, interpersonal communication. When opinion leaders retransmit the information, they tend to include their own interpretation of that information as well as the actual media content. In this way they modify the influence of the mass media (Mersham and Skinner).

Each of these models makes important points. Communication begins as a linear process (Shannon and Weaver, p. 34), but feedback makes it circular (Underwood). Attitudes are important as well (Fiske, p. 165).

Problems with Information Theory

There are several problems with information theory. First, Littlejohn states (1989) “Information theory is designed as a measurement tool based on statistical procedures” (p. 51). By this he means that messages that people send are nuanced and often cannot be deconstructed into “observable, measurable signals.” He states that while one can study the phonetic structure of a language, when one adds “paralinguistic cues”, analysis breaks down. The facial expressions, vocal pitch, volume and rhythm of speech in a face-to-face communication are examples of paralinguistic cues. The World Wide Web is rife with paralinguistic cues, which emanate from fonts, images, audio and video. Even text-only e-mail has paralinguistic cues, because many people use emoticons and acronyms when conversing in e-mail and text messages. (The first time someone sees a ☺ in an e-mail, he may ROFL.) Because of the wealth of paralinguistic cues on the Internet, it is important to study the attitudes and knowledge of senders and receivers of messages. The present study asks Web developers about their attitudes toward and

knowledge about best practices in their field, to help bring clarity to why they chose the paralinguistic cues apparent on their sites.

Another problem cited by Littlejohn is that information theory downplays meaning. By this he means there is no way to quantify the amount of shared understanding between the sender and the receiver “or the impact of the message on them” (p. 51). Unless a recipient provides feedback there is no way to know: if the message is received; who receives it; what his attitude is toward the message; and what his knowledge of the message content is. Feedback is the recipient’s behavior. A third shortcoming discussed by Littlejohn is that information theory “does not deal with the contextual or personal factors affecting an individual’s channel capacity.” In other words, it does not deal with a person’s ability to understand certain messages. Again, without feedback, there is no way to know what the recipient is thinking about a message.

Part V: The Digital Research Cycle

Many of the concepts in the models created by the earlier communication theorists above are included in the models created by the later theorists above who followed them. The terminology may differ, and some models are more complex than others, but they all share the basic principle that a sender sends a message to a receiver. Shannon & Weaver’s seminal information theory model works well as the foundation for a new communication theory model. This section introduces the digital research cycle — which incorporates some elements of the traditional sender-receiver models. It explains the roles of attitudes, knowledge and behavior in communication. This section also includes an explanation of how the digital research cycle can be used in fields as diverse as academic research, marketing and Web development.

Communication is a quasi-linear process. There is much more occurring than the sender and receiver may be aware of. Consider what happens when a woman decides to send an e-mail message to her daughter about a holiday meal. The sender has chosen a technology (e-mail), an audience (daughter), a subject matter (dinner) and a textual style (informal). Each of these decisions may have occurred to her in an instant, but possibly not. It could be that every year at the same time the mother e-mails her daughter and invites her over for a holiday meal. There is very little conscious thought involved. Or the mother may have thought long and hard about whether to invite the daughter over for dinner, thus making the audience for this e-mail a conscious decision. She may have pondered whether to e-mail her daughter or call her on the telephone, thus making her technology choice or distribution method a conscious decision. She may have considered several ways to write the e-mail, because of an argument they had recently, making her textual style a conscious decision. She may have given considerable thought about whether to host a holiday meal at all, making the subject matter of the e-mail a conscious decision. Nevertheless, when the mother is ready to send the message, it is because she considered her attitudes toward four variables: the subject matter, her audience, the technology or distribution method she wants to use and her textual style (Figure 1). The daughter then considers the same things before giving feedback. Each of these considerations is a variable that makes each of their communicative acts (their behavior) potentially different. The sent message and the response (feedback) are examples of communicative acts.

Knowledge also is important. Consider a situation in which an inexperienced Web developer is tasked with creating a site for his new employer, an investor relations firm. The firm recently lost an employee with 10 years of Web development experience to retirement. The manager gives the task to the new developer and expects him to perform at the same level as his predecessor on this first project. It

is the new developer's chance to shine. But he has never built a site about the subject matter, hedge funds. The audience is investors who are more knowledgeable about investing than the audience he previously built sites for (average consumers). In fact this audience is more knowledgeable about hedge funds than the new developer is. The technology or distribution method is the World Wide Web, with which he is familiar, but the manager wants him to incorporate new Web technology that he has never before used. Finally, the new developer, whose previous job was building sites for a consumer protection agency, is accustomed to building objective sites that tell all sides of a story. While investment firms abide by federal laws, the manager tells the developer that the site must result in an increase in sales. This creates more stress because the developer does not have a marketing background. His poor knowledge of persuasive textual styles limits his ability to build Web sites that generate revenue.

One can use the digital research cycle as the basis for researching how senders and receivers share the meaning of a message. With its consideration of the sender's and receiver's attitudes about the four variables, one can use the digital research cycle to study the shared understanding of messages and the impact they have. Through interviews and surveys of the sender's and receiver's knowledge of the four variables, the digital research cycle considers their capacity to comprehend the textual content of the messages. Consider this scenario: A researcher wants to know how the attitudes and knowledge of two people change after they engage in a computer-mediated conversation. They do not know each other and never see each other during the experiment. The subject matter is heart health. One subject is a cardiologist and the other is an average, obese, middle-aged man. The researcher's first step is to give the subjects each a questionnaire to determine their pre-test attitudes and knowledge. The cardiologist's questionnaire is about heart health (subject matter), obese patients (audience), e-mail in general

(technology or distribution method) and how to communicate with patients online (textual style). The obese man's questionnaire is about heart health, doctors, e-mail and how to communicate with doctors online. Then the researcher sends them each an identical 150-word e-mail about ways to prevent heart disease and asks them to read the e-mail and discuss it through back-and-forth e-mails until each has written 10 anonymous messages. Then the researcher has each subject fill out the questionnaire again. How has the obese man's knowledge of heart health changed because he communicated online with a physician? How has the cardiologist's attitude toward obese patients changed because she communicated through e-mail with such a patient? Would these changes in attitude and knowledge have occurred differently if they had had a face-to-face conversation in the physician's office, where their roles are more clearly defined? These are the types of questions the digital research cycle seeks to answer. That is the researcher's role. From the perspective of the sender and the receiver, the questions can be answered consciously or unconsciously. But successful digital communication requires that subjects value the core principle or thesis of the digital research cycle.

Core Principle or Thesis of this Digital Research Cycle

Any successful communication of a computer-mediated message in the information age is a behavior that is influenced by the sender and receiver's attitudes and knowledge about textual style, the audience, the technology or distribution method and the subject matter to which the message pertains.

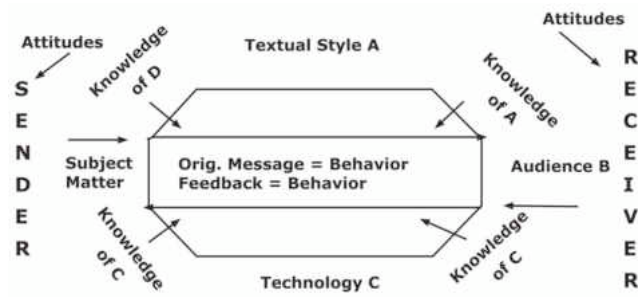


Figure 12. Digital Research Cycle

The Four Variables

Like an automobile rests on four tires, mediated communication rests on a foundation of four things: subject matter, audience, technology and textual style. And like a car whose tires have been inflated differently, each of these four aspects of mediated communication is a variable. Whether we are updating a Web site or writing an e-mail message, our communications are determined by our attitudes and knowledge. When we change our attitudes or upgrade our knowledge, we alter our behavior, which is reflected in the message we send.

In the digital research cycle, the sender must consider the implications of:

- Using textual style A to convey subject matter D
- Posting subject matter D on technology C
- Expecting audience B to use technology C
- Expecting audience B to adopt textual style A
- Exposing audience B to subject matter D
- Combining textual style A with technology C

We can change our attitude about or knowledge of the subject matter, or we can change the subject

matter. We can change our attitude about or knowledge of our audience, or we can change our audience. We can change our attitude about or knowledge of the technology or distribution method we are using or we can change the technology. We can change our attitude about or knowledge of the textual style we are employing or we can change the textual style.

Every day people choose the categories of communication they need to participate in, in order to function, based on the general and applied contexts of the communication desired. General refers to the subject matter and applied refers to the audience. At one moment an American professor might participate simultaneously in interpersonal/intercultural communication (general) and intercultural communication (applied) while talking face to face with a student from Iran. At another moment, a congressional candidate may be giving a speech (public communication) that is viewed by one thousand of her strongest supporters (political communication).

But what can be said about communication in the information age? If the professor uses a computer to send his message (through e-mail, instant messaging or online course software), or the politician streams her political speech online, how does the sender's role change? How does the receiver's role change? The subject matter of the message could remain the same when the communication moves from face-to-face to being mediated by a computer. But should not the content be altered somewhat to "fit" the new medium by changing the sender's online textual style? Online, the professor is participating in computer-mediated communication known as distance education. But the applied context of his communication is still intercultural. Even though they are not in the same room, the professor must consider the cultural differences of the student or the communication likely will fail. Online, the politician is participating in mass communication. But the applied context of her communication is still political. There are billions of subject matters that a researcher could study. There

are millions of potential audience members or combinations thereof. There are hundreds of information and communication technologies (ICT) in the information age and there are hundreds of textual styles.

Subject Matter

The first area of this formulation focuses on what Lane (2000) calls the applied contexts of communication. It is referred to here as subject matter. It is crucial that the sender of the message understands his subject matter. The sender must establish what he or she wants the message to be about. What is the topic? With billions of subjects to choose from, the sender determines the subject in advance of the communication. The sender does this by employing words that set macro-level rules for communicating. These rules tell the receiver the subject matter at hand. Ultimately, the receiver may alter the rules — by changing the subject matter — in his or her feedback. The sender's ultimate goal is to identify a subject matter that matches the interests of the receiver/audience. Occasionally, determining the subject matter of a message takes intense thought. Often it does not. On many occasions, the subject matter of a sender's message is determined by the environment around him, or by what the receiver expects to receive. The fact that subject matter is often taken for granted in the study of communication is what makes it so interesting, especially in the present context. For a communicative act to be successful, the sender and the receiver both must have knowledge of the subject matter, or one of the two must be willing to learn. Whether the sender is making a statement or asking a question, both parties must be interested in the subject matter. How many times has someone received a letter from a government agent or commercial operation that was confusing to the reader? The same can happen online as someone attempts to understand the content of a Web site. Because it is not a physical object, a Web page is likely to be discarded faster than first-class mail. That is one reason why people spend more time every day reading newspapers than online newspapers. The hardcopy newspaper has more value.

The level of comprehension about the subject matter is the same, but the receiver's emotional attachment to a piece of paper is greater than it is to text on a screen. Because hardcopy content is more valuable than online content, being successful communicating online is even more important. Attitudes toward the subject matter also are important. How many millions of unsolicited e-mail messages have recipients ignored because they were not interested in the subject line? How many links were not clicked on because the text in the link indicated a subject matter that the Web user did not care about?

The decision to employ computer-mediated communication rather than print or face-to-face communication is the important first step. Often the subject matter determines the appropriateness of the method. Here are some examples: Would a man ask a woman to marry him in an e-mail message? Should a judge announce a prison sentence on his Web site? Is college-level discussion among a "classroom" of students better suited for an actual classroom or online? Of course, cultures change over time. Before the World Wide Web existed, a nationally syndicated radio talk show host recommended against a caller faxing his resume to a business. He said using the postal service was more appropriate medium for that subject matter. Today e-mail and faxes are widely considered as appropriate communication tools for subject matter such as resumes. Computer-mediated communication saves operating costs but it is not always as effective as face-to-face communication at conveying information about a subject matter. But once the decision is made to go digital, the sender must determine his specific technology, textual style and audience.

Audience

The study of communication often privileges the sender over the receiver. The audience is invariably overlooked. This is especially true in a scenario that involves senders and receivers from vastly different economic classes. Powerful people often export — or dictate — information to the

powerless, rather than exchange it. This communicative act is top-down, patriarchal, and often the message is either ignored or resented by the recipient. To be successful, a sender instead must adapt his message to the receiver's culture, textual style and technology. This is especially true in a health care environment. Information can be communicated online, or through other electronic devices, from a sender to a receiver or a group of receivers. Before beginning a communicative act, one must determine the nature of his audience. Sometimes the audience is obvious and the choice is made subconsciously. A third party, such as a teacher or supervisor at work, occasionally chooses the audience. There are four primary forms of general communication that relate to the audience: (interpersonal, intrapersonal, group and mass). But in the information age we should also consider extrapersonal communication, or communication between machines, such as what transpires on the Internet.

Any message can be sent today via public, mass, group or extrapersonal communication. If the sender is wise, his audience dictates the type of technology used. The sender's primary goal is to identify his audience, either before or after he identifies the subject matter of his message. When one determines the audience for his message, he sets rules for his own behavior — the proper way to convey the message. If the choice is extrapersonal communication, the rules are different for a Web site for expectant moms than for a Web site remediating Soldier of Fortune magazine. For a communicative act to be successful, the sender must have knowledge of his audience. He must also understand his own attitudes about his audience. His behavior is represented by the message that is sent. Another important aspect of audience is language. Many Web sites are written only in one language, and thus are inaccessible by a great number of people. Senders should consider incorporating the languages used by as many receivers as possible when crafting a message.

Technology (Distribution Method)

Once the sender has a subject matter and an audience, he needs a technology. More questions arise. Which technology is the subject matter more appropriate for, e-mail or a Web page? Will the audience respond better (or in greater numbers) to an e-message mail or a text message? What technology should be used to send the message to the audience? The answer may be a subconscious decision or it may require conscious thought. People have communicated messages verbally for thousands of years and via writing for centuries. Radio, film and television emerged in the 20th century, following telegraphs. The Internet was invented in the latter part of the 20th century. It includes the World Wide Web, e-mail, chat, newsgroups, instant messaging, file sharing, bulletin boards and other services, both Web-based and otherwise. More recently people have communicated via personal digital assistants, “Smartphones” with e-mail and text messaging, and beepers.

When one chooses the technology or distribution method to be used in the communication, he sets rules for both himself and the receiver. Both must be technically equipped to communicate. Their technologies must be compatible. In some cases, such as instant messaging, their machines must be powered ON simultaneously. Even when it is turned off, a technology has *power*. On a CD-ROM published by the International Development Research Centre, a Ugandan telecentre manager recalls a villager’s reactions when told they would soon have computers there: “ ‘What is a computer? Is it as big as a human being? What does it do? If I touch it, can it hurt me?’ “ Even though there was no computer present, the thought of one made this villager worry, as if he were being invaded by an unfriendly force (International Development Research Centre, 2002). This technophobic reaction to technology and reactions similar to it are likely to be heard around the world, spoken by people from different socioeconomic situations.

When a sender chooses a technology on which to distribute his message, it must be compatible with subject matter, audience and textual style. For example, it would be inappropriate to advertise Viagra during a children's television show or to condense a medical textbook so that its content fits onto a single 60-minute "books-on-tape-style" CD. These points may seem obvious. That is because the mind subconsciously makes many of these decisions for us, based on our attitudes and our knowledge. But whatever the subject matter, it is important to consider different technologies before deciding the one on which to send a message.

Textual Style

Technology and distribution methods are vertical phenomena, because new technology remediates and replaces old technology. (New technology covers up old technology.) Audience and subject matter are horizontal concepts. Each audience member and subject matter is separate and distinct. Types of writing and textual styles are distinct but they are not timeless. (No one in 2009 writes in the same style as Shakespeare.) As noted by Dan Jones, style in writing is:

your choices of words, phrases, clauses, and sentences, and how you connect these sentences. Style is the unity and coherence of your paragraphs and larger segments. Style is your tone — your attitudes toward your subject, your audience, and yourself — in what you write. Style is who you are how you reflect who you are, intentionally or unintentionally, in what you write" (Jones, 1998, p. 3).

That definition is very apt for the discussion herein. Textual style is important because a sender may know his audience and may have mastered a digital technology tool such as instant messaging, but if he cannot choose the manner in which to convey the message properly to his audience while using that technology, he will fail. In many cases, the subject matter determines the textual style. Although their

uses are similar, a text about health care would require a different textual style than a text about auto mechanics. A manual that accompanies a new appliance would require a different textual style than a handbook for new employees.

Each textual style is important in the communication process because for each style there is an audience of people who prefer 1) to receive information about that style (as a subject matter; i.e. when people read about journalism or music) and/or 2) information written in the style exemplified by the genre (i.e. when people want to be inspired by poetry). Someone wishing to sell a car would choose an advertising-oriented textual style rather than an objective journalistic style. He would not volunteer detailed information about the recently repaired engine. Of course a prospective buyer would prefer objective information about the car. A service like Carfax fills that void. It lists repairs done to pre-owned cars. Someone proposing an idea to her colleagues, in a speech made before Congress, would choose a political textual style. But her communication style would be different when talking about the same subject matter in front of a small group of congressmen in a smoke-filled room or in front of a group of constituents. And it would also differ when the same ideas are posted on a Web site.

Like subject matter, audience and technology, textual style determines rules for communicating. Message senders must learn these rules and use them. Examples include the notion that journalists must always be fair and objective, whereas advertisers need not be. Each subject matter offers multiple textual styles from which to choose. For example, when writing about health care, one must choose whether to play the role of a journalist (objective), social marketer (advertising) or physician/researcher (academic, technical). Finally, for a message to be sent successfully, in most cases it is crucial that the content be relevant, accurate and ethical. This is an important rule for writing, one that is followed by many writers. The “About” page of the WebMD site states that the company’s policy is to create “original content”

based on relevance and editorial integrity. No message receiver should expect less, whether online or in a face-to-face communication. Of course it is understood that the rules are different for advertising.

Attitudes, Behavior and Knowledge

Culture is what we know, how we feel, and how we act. If communication is affected by culture, then our communicative behavior is affected by our attitudes and knowledge (Figure 12). Much communication in the information age is mediated by technology. From television and radio to Blackberry devices and cellular telephones, society has embraced machines that act as tools to help us communicate with one another. But communication does not occur in a vacuum. Communicative acts follow decisions made by the sender of the message. Either subconsciously or consciously, he asks himself: What is my attitude toward the content of my message? What is my attitude toward my audience? What is my attitude toward the technology or distribution method I am employing? Which textual style should I choose and why? These questions are accompanied by questions of knowledge: What do I know about my audience, the technology or distribution method I am using, the content of my message and the textual style I am using? The sender must answer all of these questions before sending a message successfully. The sender's behavior manifests itself in the act of sending the message. One of the primary ways the digital research cycle is a useful research tool is that it can be used to organize questionnaire items for a survey regarding one's attitudes, knowledge, or behaviors toward a subject matter, textual style, audience, or technology.

Connections Between the Variables

One analogy for successful communication might be an organism, which depends on its organs remaining functional in the same way mediated communication relies on the four variables. However,

just as a patient who needs a radiologist and an oncologist may rather be seen by a radiological oncologist (one doctor instead of two), looking for connections between the four variables is a more apt approach. The digital research cycle employs a mental or literal search engine. It allows one to make connections between concepts to unveil hidden facts, be they in the user's mind or in an actual search engine, such as Google or Yahoo! It allows one to "plug in" different combinations of primary variables to determine what the missing variables — or the four sub-variables — should be. One should look for connections between 1) textual style and audience, 2) audience and technology, 3) technology and subject matter, and 4) subject matter and textual style to narrow the research and find more appropriate information, or better answers to questions. Additionally, one can go across the digital research cycle or top to bottom and look for connections between (5) subject matter and audience and (6) textual style and technology, and show how these variables — and their relationships — affect a message.

Health Care via the Digital Research Cycle

One example of research connections occurs when health information is the subject matter and the audience is health workers using the World Wide Web (Figure 2). Using the digital research cycle, one can combine: health information (subject matter) and technical communication (textual style); technical communication and health workers in low-income countries (audience); health workers in low-income countries and the World Wide Web (technology) and the World Wide Web and health information. Sometimes one learns from doing research that it is appropriate to modify one of the variables slightly (Figure 3). Here, if "health workers in low-income countries" is changed to intercultural communication and the World Wide Web is changed to human-computer interface, the results of a search change somewhat, but they are more meaningful.

Public health, according to the Association of Schools of Public Health, is defined as “the science and art of protecting and improving community health through health education, promotion, research, and disease prevention strategies” (Columbia University, 2008). The textual style in this case is technical writing, a form of technical communication which, according to the Society for Technical Communication is defined as: ‘all processes by which humans convey meaning about the development and use of technology” (University of Minnesota, 2004). The target audience for a public health message, in this scenario, is health workers who reside in a different country than the source; so intercultural communication (communication in Lane’s aforementioned general context) is required. The chosen technology is a site on the Internet’s World Wide Web. Proper combinations of these variables result in successful communication. Poor combinations result in poor communication. For example, one would not use text messaging to explain to doctors in Africa how to perform a specific surgical procedure. The notion is obvious. The digital research cycle explains how the process occurs.

The four primary topics (variables) of this research (subject matter, textual style, audience and technology) are variables in the communication process. When one is changed — such as changing World Wide Web to human-computer interface — the others have the potential to change. For example, when the subject matter is changed, the sender’s textual style may change. (When the sender changes an e-mail subject, he may switch from a persuasive style to objective.) When the audience is changed, the technology or distribution method may need to be changed. (The new audience may have a different tool for communicating than the prior audience.) If an e-mail message is forwarded to a new receiver, the receiver may now need to install plug-in software to communicate (such as when one side sends a Microsoft Word document or an Adobe PDF attachment). When specific subject matter is changed, the changes to other variables are more specific.

Health information and technical communication combine to form medical writing. Technical communication and intercultural communication combine to form international technical communication. Intercultural communication and human-computer interface combine to form cross-cultural user-interface design. Human-computer interface and health information combine to form public health informatics. These combinations are important because they narrow the research and give the professor/student, the marketer and the Web developer a smaller, more specific target when they do their research, when they build their sites, or when they market their products. It may not always be possible — or necessary — to find connections that narrow the research, but when that happens the digital research cycle generates eight searchable terms and is complete.

Models and Shapes

Models, Fiske (1990) says, are like maps. They have limits (as do cycles). They are not comprehensive but they 1) highlight “systematically selected features of [their] territory” and 2) denote relationships between these characteristics. Also, the “system behind the selection in these two attributes defines the territory that is being modeled” (p. 37). The “systematically selected features” within this paper are subject matter, textual style, audience and technology, all of which — as previously noted — have relationships with one another. The digital research cycle is the “system behind the selection in these ... [four] attributes that defines the territory that is being modeled” in this dissertation.

Like information theory (Figure 5), the digital research cycle has a sender, a receiver and a transmitter. But the digital research cycle elevates the sender’s subject matter (signal or received signal) to the same level of importance as the sender, receiver and transmitter and adds textual style at that level as well. The result is an adaptation of Lasswell’s 1948 model:

Who

Says what

To whom

Using what digital device

And how did he say it?

The terminology in the digital research cycle is slightly different from Shannon and Weaver's information theory.

Information Theory	Digital Research Cycle
Information Source	Sender
Message	Content
Transmitter	Technology or Distribution Method
Signal	Subject Matter
Received signal	Subject Matter
Receiver	Audience
Destination	Audience
(Not used)	Textual style

Shannon and Weaver have no equivalent for textual style. Westley and MacLean's model (Figure 8) does add an "editorial communicating function" (Fiske p. 33). Like their model, the digital research cycle attempts to answer the questions "what and how to communicate." The "what" question relates to the message or content and the "how" question relates to two concepts: it relates to technology, which Shannon and Weaver call the transmitter; and it also relates to textual style, a concept that deserves more attention in academic discussions of communication theory.

Shapes of Research

The phrase communication “pattern” is not uncommon. Communication patterns are found in concepts as diverse as marriages (Carroll, n.d.) and parallel scientific algorithms (Ganapati, Otto and Walpole, 1994). However, to say that communication can be illustrated in “shapes” would likely stir debate. Nevertheless, in Littlejohn’s (1989) text, *Theories of Human Communication*, and Fiske’s (1990) text, *Introduction to Communication Studies*, both authors use shapes, grids and graphics to illustrate their text; images such as Newcomb’s triangle (Fiske p. 31), a six-cell box (forms of behavioral explanation) (Littlejohn, p. 70), and a diamond (the classical ideal of science) (Littlejohn p. 19). During the research phase of the present study, it was determined that an octagon can be used to illustrate the theory herein. The relevance of the octagonal shape of the digital research cycle is described below and illustrated in the figures in this chapter.

Scholes, Comley, and Ulmer (1995, p. 100) write “THEORIES ARE BUILDINGS” (capitalization theirs). For the present research, the “building” is an octagon. An octagon has four sides and four connecting lines. The four sides of this octagon represent subject matter (health information), textual style (technical communication), audience (intercultural communication) and technology (the World Wide Web). The decision to find connections between the variables was made after it was determined that narrower topics could be found. The model shows how — as Fiske believes — models denote relationships between disciplines (p. 39). The circuitous nature of digital research cycles also represents an important concept — information flows in many directions, not just top down. While much information is exported from source countries to target countries, often now it is exchanged. Success requires collaboration.

Influence of Other Communication Theories

The theories espoused by the communication scholars mentioned above each were built upon the work of their contemporaries in the communication field. In 1948, Lasswell asked who/says what/in which channel/to whom/with what effect (Fiske, 1990, p. 30). This question was a root for Shannon and Weaver's 1949 model, which essentially included the "whom" (information source), the "what" (signal or message) and the second "whom" (receiver), but makes no reference to the effect. Gerbner relates Shannon and Weaver's "message to the 'reality' that it is 'about' and thus enables us to approach questions of perception and meaning" (p. 24). In other words, the message is taken to a higher level of understanding. Newcomb's 1953 model (p. 31) has a sender (A) and a receiver (B) and incorporates a social environment (X). Osgood and Schramm's circular 1954 model shows that communication is "endless." Westley and MacLean's 1957 model is similar to that of Shannon and Weaver in that it is linear. Like Gerbner's work, it includes a category for "perceiving" (Lazarski, 1999). Westley and MacLean also add the social need for information (Fiske, p. 32). In 1960, Jakobson's model included the "six factors that must be present for communication to be possible" (Fiske, p. 35): addresser, context, message, contact, code and addressee. Finally, Katz and Lazarsfeld's two-step model (Mersham and Skinner, 1999) is similar in concept to Rogers' diffusion of innovations (1983) in that both involve the communication of information by opinion leaders to the masses.

Use for Survey Generation

The digital research cycle incorporates parts of these theories. It includes the sender, receiver, message and transmitter that are in Shannon and Weaver's model. Gerbner's model involves a human perceiving an event. The digital research cycle says that humans consider their own attitudes about the message, the audience, the textual style and the technology or distribution method before sending a

message, or before sending feedback. In Newcomb's triangular model, if A and B are friends, and they have similar attitudes toward X, their relationship — as Shakespeare said — will be “in accord.” In the digital research cycle, if the sender's attitude toward a message he sends is similar to the receiver's attitude toward the same message, the transmission of the message will likely be successful.

The next section of this chapter represents research conducted using the digital research cycle to help write questions for a survey of Web developers who build sites to be viewed by people who live in low-income countries. As Figure 12 demonstrates, the first variable studied, subject matter (health information), is connected to the second variable, medical writing. The third variable, technology (human-computer interface), is connected to the fourth variable, public health informatics. Technology and the fifth variable, audience (intercultural communication), both are connected to the sixth variable, cross-cultural user-interface design. Audience, which is parallel with the subject matter in Shannon and Weaver's linear model, is parallel with subject matter in the digital research cycle. The seventh variable is textual style (technical communication). Textual style and audience are connected by the eighth variable, international technical communication.

Subject Matter/Health Information

The health of children in low-income countries is a significant issue for health workers around the world. This is because some 14 million children under age 5 die each year in low-income countries. The health workers know that even though these diseases are treatable, more people will die of diarrhea, measles, tetanus, pertussis, pneumonia, and malnutrition than anything else (Nahata, 1992, in Selke, n.d.). The most prevalent infectious disease syndrome in the world is infectious diarrhea, which is caused by “direct infection of the gastrointestinal tract by such organisms as rotavirus or salmonella” (Reisinger, Fritzsche, Krause, & Krejs, 2008). More than five million people die each year of infectious

diarrhea, a number that is greater than that of cancer and AIDS combined (Carroll and Reimer in Selke, 2000). Just as infectious diarrhea can be treated by oral rehydration therapy (Rehydration Project, n.d.), many diseases in Africa can be prevented by application of a vaccine. However, according to the World Health Organization (WHO), more than three million children die each year in Africa from vaccine-preventable diseases. “The results from 53 low-income countries with nationally representative data on child weight-for-age indicate that 56 percent of child deaths were attributable to malnutrition’s devastating effects, and 83 percent of these were attributable to mild-to-moderate as opposed to severe malnutrition” (Pelletier, Frongillo, Schroeder, & Habicht, 1995, in Selke, n.d.). Some 98 percent of all such deaths among children younger than 15, and 83 percent of all such deaths of people between ages 15 and 59, occur in low-income countries.

Medical Writing

Like health care professionals, medical writers and their editors have “responsibilities to the public, the scientific community as a whole” (Council of Science Editors 1, 2008). While experts in public health strive to cure clients and prevent diseases, and informatics specialists provide the tools to disseminate information digitally, someone must first generate the content. Medical writers are technical communicators and journalists who have chosen to pursue careers in which they specialize as medical and health content providers. There are many career options for medical writers. In *Health Writer’s Handbook*, Gastel (1998) notes that they work for newspapers, health care systems, health care newsletter publishers, the U.S. military, health care providers, universities, non-profit organizations, and medical journals, among others (pp. 178-179). Medical writers collaborate with public health physicians, graphic artists, Web developers and others to develop the Web sites that are linked off Essential Health.

Quality content begins with good writing. Good writing requires having adequate knowledge, tools, and enthusiasm to create quality content. This is especially true in medical writing, where mistakes left undiscovered can result in deaths. Gastel writes about evaluating health information, assessing the audience, showing sensitivity, presenting risk, and being ethical. When ethical issues arise, she recommends considering the following questions: “What good is likely to result from the action? What harm could result? Is the action consistent with such basic values as truthfulness? Is the action fair — or does it favor some people over others? Is the action consistent with a respectful and caring approach to other people? Are there alternatives to consider?” (p. 159). Content that is not ethical should never be posted online. Once that issue is resolved, content must still be usable. As Pakenham-Walsh once noted, “If health workers do not have access to the information they need at the point of care, then the direct health benefits are limited” (Morley, 2007).

History and Theories

Lang (2000) divides medical writing into three eras. The first era (Age I) coincided with the earliest writing. During this period, the authors of the “great texts of the ancient world” recorded the accomplishments of “ancient healers”, looking particularly at their “intuitions, beliefs and traditions” (Lang). During the second era, medical writing became more than an historical record. It became the means by which information was exchanged between physicians. Schools of thought blossomed from the notion that information was being authored, not just repeated. “Experimentation and evidence are allowed to establish truth” in the third era, despite the resistance of advocates of tradition, authority and intuition. Lang distinguishes science from tradition, authority and intuition by saying that the former exists in the public domain, must remain objective, must be predictive and reproducible, and must be systematic and cumulative. “Writing is the only medium of communication that allows these

characteristics to flourish,” he writes. “... Science itself would simply not exist without writing” (Lang).

During the 20th century, Louis Pasteur introduced the familiar scientific writing sequence “Introduction, Methods, Results and Discussion (IMRD).” After style manuals became common, publication became the “final stage of research” (Lang). The author argues that from that period forward, any scientific work that lacked publication was irrelevant research (Lang). The medical writing field grew during and after World War II. During the war medical writers were increasingly non-physicians. After the war, the pharmaceutical industry boomed, and more writers were hired. Medical writing gradually became a profession, particularly as fewer practitioners were physicians.

Many medical writers have a dual role. They must remain objective about science, but their primary goal is to promote health care practices. One of the most important aspects of health care in developed and low-income countries is effective promotion of effective strategies for treatment and prevention of disease. Just as there have been many advancements in medicine over the past few decades, the ability of American health care professionals to achieve health promotion objectives has been enhanced by much progress in the development of behavioral and social science theory (DiClemente, Crosby and Kegler, 2002, p. 1). Among the models that have emerged from this research are: The precaution adoption process model; the elaboration likelihood model of persuasion; the authoritative parenting model; natural helper models; community coalitions, community capacity, social capital theory, prevention marketing, conservation of resources theory, the theory of gender and power, and the behavioral ecological model (DiClemente, Crosby and Kegler, 2002, p. vii). Below is a brief explanation of each of these models. It is important to note that these models have been tested predominantly in the United States. However, where appropriate, they can be applied to low-income countries.

The precaution adoption process model — People take different precautions against unhealthy behavior at different stages in their lives. Those who have already engaged in the behavior already will have formed different beliefs about that behavior than others who have not engaged in it and their approach to taking precautions will differ accordingly. The goal of researchers who use this model is to “develop different explanations for what goes on in these different phases” (Weinstein and Sandman, 2002, p. 16-17).

The elaboration likelihood model of persuasion — Proponents of this model — which is highly relevant to advertising — believe that decisions are led by attitudes and that persuasion is the basis for attitudes. Persuasion can be the result of either of two processes: central (high motivation) or peripheral (low motivation) (Universiteit Twente, 2003). Central processes include those where one uses his or her past experiences to guide them in making a decision. Peripheral processes include those in which a decision is not based on “effortful evaluation” (Petty, McMichael and Brannon, 1992).

The authoritative parenting model — Parents who are both responsive to their children’s needs and “demanding of their behaviors” are considered authoritative. Authoritative parenting results in positive behavior by children and adolescents (Simons-Morton and Hartos, 2002). It would be wrong to assign a “parenting” role to Web developers who build Web sites for health workers in developing countries. This theory is appropriate if one considers health communication a top-down process, where information is “exported” to health workers. For those who believe rather that health information should be “exchanged,” this theory is worth knowing, but it would not be advocated.

Natural helper models — A natural helper is someone whom others seek out “for advice, emotional support, and tangible aid” (Eng and Parker, 2002, 126). In some cultures they may be barbers or church members. In developing countries, midwives who are not officially sanctioned by the state or

an NGO might fill this role. A medical writer could play the role of a natural helper.

Community coalitions — Butterfoss and Kegler (2002) write about groups joining forces to deal with community problems. Collaboration results in the expansion of resources. Sharing resources means problems can be solved more quickly and more effectively (p. 157). Examples include alcohol and drug dependence, AIDS and teen pregnancy (National Research Center, Inc., 2003).

Community capacity — Gebbie, Rosenstock and Hernandez (2003) define community capacity as “a *social protective factor* or a ‘ . . . condition that can mitigate social ills’ ” (Goodman, 2008). Communities are seen as both part of the problem and part of the solution. Based on this premise, some researchers have taken an ecological approach to public health interventions that use “a systemic perspective regarding the interdependence of people, institutions, services, and the broader social and political environment” (Norton, Burdine, LeRoy and Dorsey, 2002).

Social Capital Theory — When public health officials collaborate, certain things occur that would not happen in a typical doctor-patient setting. Populations are emphasized. Infrastructures are studied and connections between illnesses and social issues are explored (Kreuter and Lezin, 2002, p. 228-229).

Prevention Marketing — This model includes values from three disciplines that “focus on various levels of the system of health influences” (Kennedy and Crosby, 2002, pp. 255-256): behavioral science, social marketing, and community development. It was conceived in the 1990s to help federal officials generate human immunodeficiency virus (HIV) prevention activities that targeted American youth.

Conservation of Resources Theory — This model offers a framework for implementing public

health promotion strategies by focusing on the resources of individuals and communities. It provides a theoretical model for preventing resource loss, maintaining existing resources, and gaining resources necessary for engaging in healthy behaviors (Hobfoll and Schumm, 2002, p. 285).

The Theory of Gender and Power — In some cultures, women are forced to engage in behaviors that have both positive and negative outcomes. For example, being sexually active may lead to marriage, a home, and financial security, but it could also result in her contracting a sexually transmitted disease (Community Prevention and Intervention Unit, 2003).

The Behavioral Ecological Model — This model is based on the premise that current medical and educational practices are inadequate in the prevention of AIDS-related behavior. Rather, “multiple interventions, with emphasis on change in social networks” is the key to holding back the AIDS epidemic (Center for Behavioral Epidemiology and Community Health, 1994).

Good medical writers concern themselves as much with the theories behind their work as their conduct of it. The Web developers and their medical writers who are respondents to the survey herein are producers of information. Health workers are consumers of information. Communication between them is a linear process between sender (producer) and receiver (consumer) (Littlejohn, 1989, p. 42-46, Fiske, 1990, p. 22). The activation theory of information exposure states that individuals need to be stimulated by a message more than they need to be informed. The theory “explains how individuals seek messages that fulfill their cognitive need for information as well as their need to be entertained” (Lane, 2001, February 14a). One field in which activation theory is widely employed, advertising, where the goal is to send convincing messages to consumers, has similarities to medical writing. For messages to take hold, researchers must understand the cognitive and emotional needs of their audiences (Lane). But they must be careful to fill this cognitive need of others while remaining objective.

The Writers

Health Writer's Handbook, by Gastel, is written for medical writers new to the field. For other theories and theorists that provide the foundation for this field, one might first seek to determine exactly which narrow sub-field to study. One could look for studies on medical writing, science writing, science journalism, biomedical writing or biomedical communication, among others. There also are a number of organizations in the field, from the American Medical Writers Association to the Council of Science Editors. Others include:

- Board of Editors in the Life Sciences
- European Medical Writers Associations (EMWA)
- Society for Technical Communication
- National Association of Science Writers
- Association of Health Care Journalists
- Association of Clinical Research Professionals

Academic Curriculum —An article in *CBE Views* (Lang, 1999), a bimonthly publication of the Council of Biomedical Engineers, states that medical writing curriculum should include:

- Data-collection techniques (interviewing, Internet, libraries)
- Audience analysis
- Techniques of writing
- Collaborative writing
- Writing original research articles: the IMRD format
- Writing review articles, case reports, and chapters

- Writing feature and news articles
- Writing patient-education materials

Ethics in Medical Writing — In her book Gastel reprints the American Medical Writers Association Code of Ethics, which is paraphrased here:

Principle 1 — Medical writers should obey statutes and regulations relating to the pieces they write. This pertains to state and federal laws, in addition to codes of ethics established by medical boards. It makes sense to achieve and maintain the same high ethical levels as the health professionals for whom one is writing. Many medical writers are themselves health professionals (Gastel, p. 251).

Principle 2 — Writers should be fair and objective in their reporting and their writing. They must strive for, achieve and maintain “scientific accuracy and rigor” in their work (Gastel p. 251). The latter phrase has been included in human resources texts. For example, an employment application for “scientific supervisor,” a marketing position at Grey Healthcare Group, a pharmaceutical/biotech firm based in Stamford, Conn., states that the person in that position “is accountable for the client satisfaction, scientific accuracy and rigor, and strategic and creative excellence of all projects and proposals for which he/she is responsible” (Grey Healthcare Group, 2008).

Principle 3 — Writers should strive to ensure that the information they are generating meets “highest professional standards” and that they undertake a project only with the assistance of qualified health personnel (Gastel, p. 251). One of the continuing education courses offered by the American Medical Writers Association is entitled “Ethical Standards in Medical Publication” (American Medical Writers Association, 2008b).

Principle 4 — If an assignment requires the writer to participate in unethical or questionable

practices, he should not participate (Gastel, p. 251). An example would be a medical doctor being paid to allow for his or her name to be placed on an article ghost written by a pharmaceutical company public relations representative or an employee of a medical education company.

Publications such as the *Journal of General Internal Medicine* (JGIM) are taking action against the threat of ghost writing. JGIM, according to Haggard (2005):

alerted members of the World Association of Medical Editors (WAME) that submitted papers may not properly acknowledge corporate funding or co-authorship and encouraged making “clear in their journal’s information for authors that medical writers can be legitimate contributors and that their roles and affiliations should be described in the manuscript (Haggard).

Principle 5 — Medical communicators should participate in continuing education so as to “expand and perfect” their knowledge and skills (Gastel, p. 251). To that end, the AMWA offers an array of CE programs to health/science writing professionals (both novice and advanced). During its annual conference, AMWA offers more than 100 courses, including curriculum workshops that participants can apply toward core or advanced certificates. The AMWA Web site states, “earning an AMWA certificate is considered part of a career path in the field and is required by some employers” (American Medical Writers Association, 2008a).

Principle 6 — Confidentiality is essential when a health writer is dealing with patient, patent or proprietary information (p. 251). Patient privacy is essential. The United States Federal Government’s Standards for Privacy of Individually Identifiable Health Information “establishes, for the first time, a set of national standards for the protection of certain health information” (Department of Health and Human Services, 2003). Meanwhile the Health Insurance Portability and Accountability Act of 1996

was designed to protect patient information, but resourceful medical writers can obtain patients' permission and interview their physicians (p. 174).

Principle 7 — It is essential that medical writers honor contracts. Extensive projects (books) require detailed contracts. Small projects probably do not (pp. 261-262). Medical writers should “expect and accept” appropriate monetary compensation for their work. There are temptations to do otherwise. According to one organization of medical writers, half of its members reported not having had a pay raise in three years. “The guild is currently looking at what we can do about low pay,” Caroline White said. A compensation survey “revealed some horrible patterns and highlighted the discrepancy between medical writers and those in other vocations, for example property and finance, who are comparatively better paid.” White suggests that one solution is to make medical writers more visible. She also thinks questions of “integrity and independence” should be addressed (Writers' News, 2008).

Principle 8 — Medical writers should consider their AMWA memberships “an honor and a trust” (p. 251). Gastel is an “honored member” of the Board of Editors in the Life Sciences (BELS). This organization, which was founded in 1991 by a group of editors, “offers [AMWA members and others] certification through a 3-hour multiple-choice test of scientific editing in English. ... The program is designed to assure employers or clients of editors that a Board-certified editor has established a high level of credibility” (Board of Editors in the Life Sciences, 2008). Like medical doctors (M.D.) and professors (Ph.D.), those who are certified in ELS may use the initials ELS behind their names.

The Council of Science Editors (2008) is a consortium of more than 1,200 organizations “involved in the communication of scientific information” who are interested in “improving communication in the sciences” by holding meetings and offering short courses, retreats and workshops. The CSE publishes *Scientific Style and Format* (7th edition) and the bimonthly *Science Editor* (Council

of Science Editors, 2008b). CSE sponsored a Global Theme Issue in October 2007. Dozens of journals, including the *Advanced Emergency Nursing Journal*, the *Journal of Indian Association for Child and Adolescent Mental Health*, the *Journal of Manipulative and Physiological Therapeutics* and the *Western Journal of Nursing Research*, were to simultaneously publish papers on “Poverty and Human Development.” Their goal was to “raise awareness, stimulate interest, and stimulate research into” this important topic.

Medical writers in Europe join the European Medical Writers Association (2008). Members can participate in an online dialogue in a bulletin board on the association’s Web site. Associations also are excellent resources for finding jobs in the field. The Canadian Science Writers Association’s Web site (2008) offers a job board with members-only access. Meanwhile, the National Association of Science Writers (2008) follows a code of ethics that calls for medical writers who are members to represent the organization with dignity and refrain from taking political positions. They are, however, allowed to take positions in journalism. One of the organization’s goals is to “foster the dissemination of accurate information regarding science and technology in keeping with the highest standards of journalism” (NASW).

Science Journalism

Science journalists are typically older than their colleagues who write for other sections of a newspaper, such as the police beat, features or sports (Storad, 1984, in Shoemaker and Reese, 1991, p. 72). Because the beat is technical, they also are usually better educated. The job for many is to “translate technical reports into language that the layperson can understand” (Shoemaker and Reese). In addition to working for magazines, newspapers and other media, science journalists who are well regarded in their field are invited to participate as fellows in academic programs at several universities in the United

States. One such program is the Knight Science Journalism Fellowship at the Massachusetts Institute of Technology. Several of the 2007 fellows planned to participate in activities related to public health. Friebe planned to study how societal inequalities impact public health. Guterman, Nano, Song and Lu planned to study public health in general (Henry, 2006).

Public Health Informatics

Public health informatics (PHI) is a discipline that sits at the crossroads of public health and computer science. Yasnoff, O'Carroll, Koo, Linkins & Kilbourne (2000) say it is chiefly an engineering discipline, in that its applications are practical, it has science as its foundation, and it is geared toward the accomplishment of tasks. "The scope of public health informatics includes the conceptualization, design, development, deployment, refinement, maintenance, and evaluation of communication, surveillance, and information systems relevant to public health" (Yasnoff, O'Carroll, Koo, Linkins & Kilbourne). It is interdisciplinary. Information science, computer science, management, organizational theory, psychology, communications, political science, and law all play a role. To be successfully practiced, public health informatics also must embrace knowledge from fields that make up public health, including epidemiology, microbiology, toxicology, and statistics, among others.

The sites linked off the Essential Health Links Web site play a small but vital role in the field of public health informatics. Essential Health Links is a very useful tool for health workers who battle epidemics daily in low-income countries. It would be helpful to determine to what degree the Web developers of various sites linked off the gateway consider the four "critical issues" — referred to in the Introduction — when building and maintaining their sites: subject matter, audience, textual style and

technology. As Pakenham-Walsh writes:

Much of the information currently available to health care workers in the South is irrelevant to local needs. It must be in a language that is accessible, preferably the first language of the reader. And it must be reliable. Too many health care workers in developing countries have to rely on biased information from pharmaceutical companies, out-of-date or irrelevant information from unselective donors in the North, or materials produced without adequate source materials or resources (Pakenham-Walsh, Eddleston & Kaur, 1999).

It is important to prevent technology from driving the decision-making process, to not employ the newest software on Web sites merely because it can be employed. Rather than look at new technology and ask, “What can we do with this?” we should look at problems and ask, “What technology might help here?” (Norrish, 1996). The implications of privileging technological innovations where they are not appropriate can be seen in agriculture. O’Farrell, Norrish and Scott (1999) look at the effects of new communication technologies on farmers and entrepreneurs in rural communities. The primary question is whether new information and communication technologies (ICT) marginalize disadvantaged communities. Their findings, which are relevant to health workers, are that communication technology transfer failures are “downplayed and accurate costings are rarely available ... The introduction of new information systems, particularly those that are text based and delivered via new communication technologies may conflict with existing information sources and communication channels” (O’Farrell, Norrish and Scott). These findings are consistent with the challenges facing Web developers and health workers in the communication of health care information across borders.

It was important to determine whether the concepts addressed by the questionnaire in the present study are important to Web developers. As Nardi and O'Day (1999) write in a description of their book, *Information Ecologies: Using Technology with Heart*, “those who are creating technology are pouring their hearts into it, but aren't using their heads enough to anticipate whether ‘our creations can betray us.’ ” Porter outlines examples of applications of ICTs for health professionals, dedicated to areas such as professional development and training, information dissemination, data, information and resource access, information and knowledge management, telemedicine, and networking and collaborating (Porter, 2003, p. i-ii). “All of them need more research to determine their impact and develop best practices,” Porter writes. “All of them can be and are being used by health professionals in developing countries to aid their work” (p. 30).

Rhine coordinated a sister library relationship between the University of Florida Health Science Center and the University of Zambia Medical School. He developed an Excel spreadsheet containing a list of 15 “Evaluation Criteria and Quality Indicators” related to Web site effectiveness (2003). Nine of the indicators are associated with content — such as relevance and scope of content and accuracy and balance of content — while six relate to usability — such as site access and usability and Web site communication. Rhine also created two relevant PowerPoint presentations, “Evaluation of Health Sites on the Internet” (2003) and “Usability Studies: Testing a Website” (2003). The former presentation outlines a number of issues, including: Purposes of implementation of quality criteria for health related Websites; Methods of implementing quality Criteria; Guidelines for producing/reviewing health information; and Criteria for assessing the quality of health information on the Internet. The latter presentation discusses the Stanford Guidelines for Web Credibility; Evaluating Web sites for accessibility; Characteristics of usability; Guidelines for homepage usability; and Methods for designing

usable Web sites.

The purpose of the present research is to assess the attitudes of Web developers toward using concepts that might be useful in building Web sites for health workers in low-income countries. It is important to understand the impact of technology on low-income countries. Global development organizations recognize the importance of ICTs to health care in low-income countries. UNESCO's *World Communication and Information Report 1999-2000*, released in November 1999 states that:

[T]he eradication of poverty has become a multi-dimensional activity. Poverty is considered to be more than a lack of material well-being. 'It also reflects poor health and education, deprivation in knowledge and communication, inability to exercise human and political rights and the absence of dignity, confidence, and self-respect (UNDP, 1997, p. iii). ICTs play a prominent role in this broader conception of poverty. They provide important tools for the improvement of health and education, offer new channels for the diffusion of knowledge and create physical and virtual spaces for social communication (United Nations Educational Scientific and Cultural Organization, 1999).

The benefits of a world in which health care information is available on demand, from any location, are numerous, and many researchers believe technology is the key. The overall health of a community improves when information and communication technologies (ICT) are harnessed and adopted by everyone, from individuals to governments, Odutola (2003) writes. "These technologies have also been shown to democratize the public space by fostering freedom of choice and expression as well as rapid access to and sharing of information" (Odutola).

Medical writers in the 21st century will continue to turn to the World Wide Web for research.

One important source for scientific information is the National Science Digital Library (NSDL), which the National Science Foundation and others worked on for more than a decade (American Association for the Advancement of Science, 2008). It is a Web-based library of information about science, technology, engineering and mathematics (STEM). One goal for the NSDL is to create access to information that is “high-quality, accurate, and truly useful” in science education. In addition to being useful to medical writers, it is designed for educators to access to acquire science and math material for use in the classroom as well as in their quest for professional development (National Science Digital Library, 2008).

Essential Health Web Links Criteria

In its “Criteria for Selection and Evaluation” for Essential Health Links, AED/SATELLIFE (2008b) requires that Web sites meet five of these six criteria: 1) Authority: Is the source of the information reliable? 2) Coverage: Is the subject covered adequately by the resource? 3) Presentation: Is the source professionally presented? 4) Are there any typographical or grammatical errors? 5) Currency: Is the information kept up-to-date? 6) Cost: Is there no charge for using the site? 6) Are there no restrictions on use of the material by recipients? The purpose of this research is not to grade these Web sites on the six criteria. That was done before they were added to the site. The purpose is to survey the Web developers as to their attitudes toward best practices related to quality of content (criteria 1-5), cultural differences and technological roadblocks.

Medical Records

Health informatics involves not just the presentation of vetted health information in a digital environment. It also relates to digital health record keeping. Zwarenstein, Seebregts and Timmerman (n.d.) set up an informatics system for HIV/ART (Anti-Retroviral Therapy) care. They began their

project intending to work on “syndromic management of respiratory conditions.” But their work evolved and they “ended up supporting the design and implementation of a clinical system for primary care of HIV patients, and a record system to support this, including an electronic version of it and a migration onto a large proprietary electronic medical record system being implemented by the province” (Zwarenstein, Seebregts and Timmerman). They published their findings, labeling them as “lessons.” The authors state that while it may be very difficult, it is possible in low-income countries to institute an electronic medical record system for HIV/AIDS patients — that prospers. To do so one must acquire “the highest level of policymaker commitment — not to the technology problems, but to the health services problem at which it is aimed” (Zwarenstein, Seebregts and Timmerman). The authors also found that understanding a patient’s health care issue is far more important than any issue involving information and communication technologies (ICT). Among their 10 findings: Successful implementation of an informatics system requires cooperation between personnel from both health systems and information systems. Health system researchers valued their independence, because they were free to worry about improving the health care system and free from worrying about profit. Further, Zwarenstein, Seebregts and Timmerman state that “[r]esearch attitudes (sic) — especially precise definition of a problem — are a vital asset.” Durbin (2004) defines a research attitude as a feeling that “arises from a desire to question, evaluate, and investigate clinical practices.”

Another finding is that devices such as Palm Pilots and other personal digital assistants (PDAs) “proved to be a very viable large scale, high volume data collection solution for data capturers taking data from structured paper records filled in by clinicians” (Zwarenstein, Seebregts and Timmerman, n.d.). They described their PDAs’ battery life, speed, screen and keyboard size and toughness as well as hookups via telephone to the data collection server as “robust.” Of utmost importance, the devices could be used in clinics that were without electricity. Researchers were able to link their PDA-based data with

that of desktop-based systems that were available in those clinics that had electricity. The program was rolled out in the province to all clinics that had a supply of electricity. There were some problems, including the desktop system's design, and some basic database design flaws.

In this environment, the researchers prefer to identify patients in their records by some method other than their names, but to still ensure that each identification is unique. Best options include smart card, biometrics or display of a valid national photo identity card. Such a system is vital to maintaining quality of record keeping and care. The authors recommend that digital data be stored in a “data warehouse which is organised dimensionally (sic) for speed and ease of query access and reporting” (Zwarenstein, Seebregts and Timmerman). They also stated that data collection systems should be equipped with “data quality checks” as well as feedback to ensure that information is being entered and stored properly. Finally, the authors recommend that data collectors receive training. They say that these workers are underpaid for a difficult job and that training would improve their morale. They also state that medical clinicians also should receive training on the PDAs.

Evidence Based Health Informatics

Evidence-based health informatics has been described as “the conscientious, explicit and judicious use of current best evidence when making decisions about information technology in health care” (Ammenwerth and Machan, 2006). How important is it? The authors cite two papers that declare EBHI to be vital in the quest for better health care. They add that EBHI is similar to evidence-based medicine and hope that — like the latter — practitioners of the former will successfully employ methods such as meta-analyses. They doubt this is possible with EBHI because successful meta-analyses require “very homogeneous studies, evaluating well-defined interventions in comparable settings using standardized effect measures” (Ammenwerth & Machan). The authors conducted a review of some 200 computerized physician order entry systems (CPOE) evaluation studies in an effort to assess the

usefulness of EBM methods in health informatics. After identifying and analyzing some 200 CPOE evaluation studies, they performed a quantitative meta-analysis on 42 of them, finding a “clear positive effect of CPOE” (Ammenwerth & Machan). By this the authors mean CPOE can assist in the reduction of prescription costs, medication errors and adverse drug events. The authors state further that while their quantitative meta-analysis based on quantitative controlled studies indicate mostly positive effects of CPOE, “a contrasting analysis of other studies (uncontrolled case studies, qualitative studies)” reveal evidence of negative effects that the quantitative controlled studies do not show. They attribute this inconsistency to negative publication bias, stating that research studies that indicate no or negative outcome are likely not to be published.

Databases

One of the most popular forms of health informatics is databases that aggregate health information. Like the ERIC database for educators, PubMed is a tremendous source of health information for health workers, particularly those in low-income countries whose time and resources are limited (PubMed, 2008). PubMed, which is published online by the National Institutes of Health and the National Library of Medicine, aggregates some 16 million citations for biomedical journals from Medline as well as other scientific journals dating back to the 1950s. Unlike some other databases, PubMed includes links to full text articles. NIH and NLM also sponsor Medline and MedlinePlus. It contains information from NLM, NIH and other government agencies as well as health-related organizations (MedlinePlus, 2008). MedlinePlus contains preformulated Medline searches which the site says give “easy access” to biomedical journal articles. Additionally, MedlinePlus contains information on an array of other subjects, such as drugs, and contains an illustrated medical encyclopedia. It also has interactive patient tutorials and the latest health care news.

The full text of all articles published in the weekly *BMJ* since January 1994 is posted at bmj.com, which was launched in May 1995 (BMJ — British Medical Journal, 2008). The site also contains unique content. Meanwhile, the Cochrane Collaboration is a non-governmental organization, international in scope, which is dedicated to “making up-to-date, accurate information about the effects of health care readily available worldwide. Its organizers strive to achieve this goal by producing and distributing “systematic reviews of health care interventions” (Cochrane Collaboration, 2008). Founded in 1993, the organization also “promotes the search for evidence in the form of clinical trials and other studies of interventions.”

Ethics

From warnings on tobacco advertising to news items during the Tylenol tampering scare, health care information is typically useful. But it is useful only when it is accurate and presented ethically. The need for accuracy and ethical presentation does not end at the physician or researcher’s door. It extends to that of the technical communicator or health writer who generates content about the research. But is communication technology in health care part of the problem or part of the solution? Where does one draw the line between the efficacy and ethicality of utilizing a technology such as the Web to disseminate information? Paul Dombrowski (2000) writes that Winner “critiques ‘autonomous technology’ as the feeling that what we *can* do, we *should* do, a sort of imperative that cannot be opposed or defused” (p. 103). It is not just what information is imparted that matters. How it is imparted has serious ethical repercussions as well. This includes not only the language but also the absence of language, the voice, the organization, the purpose, and the values at work behind the scenes in a communication.

The Internet Healthcare Coalition launched an International Code of Ethics for health care sites and services on the Internet in May 2000, as part of its eHealth Ethics Initiative. Published online in six

languages, the goal of the writers of the code is “to ensure that people worldwide can confidently and with full understanding of known risks realise the potential of the Internet in managing their own health and the health of those in their care.” The core beliefs behind the code are candor, honesty, quality, informed consent, privacy, professionalism, responsible partnering, and accountability. Crigger (2001) says the Internet has the potential to both help and hurt society.

The Internet offers real potential to improve well-being by offering unprecedented access to health information, products, and services. At the same time, it also makes possible forms of communication and kinds of practice that raise ethical, social, and legal concerns. We are only beginning to develop a clear, shared understanding of how to participate in the virtual environment of the health Internet. And only beginning to think carefully about what opportunities we can take advantage of and what opportunities may be technically possible but are ones that we should not pursue in the new world of ehealth (Crigger).

Anderson and Goodman (2002) write about the eHealth Code of Ethics as well as the American Medical Association (AMA) Principles, Health Internet Ethics, Health on the Net Foundation (HON) Code of Conduct, TRUSTe Consumer Privacy Protection, and the TRUSTe Model Privacy Statement. Consumer health information is a growing market on the World Wide Web. The information these sites provide can be timely, high in quality and empowering to consumers. However there is a risk that the information can be incomplete or harmful (p. 14).

Audience/Intercultural Communication

In order for a sender and a receiver — a source country and a target country or a Web developer and a health worker — to successfully exchange information, the former entities must understand the attitudes, behaviors, needs, and desires of the latter entities. Intercultural communication is the study of

communication of information across geographic borders and/or sociological boundaries. Among the theories pertinent to this field are: uncertainty reduction theory (with anxiety uncertainty management theory), critical theory (Habermas), critical theory (Deetz), cross-cultural adaptation and face negotiation (Lane, 2001, February 21). Below is a brief description of each:

Coping with Uncertainty

This theory is based on the notion that information exchange improves when communicators reduce their anxiety and decrease uncertainty (Lane, 2001, February 19a). It comes from the sociopsychological tradition, whose theories focus on the variables that change behavior during an interaction (Littlejohn & Foss, 2005, p. 144). One of the ways we change our behavior is to avoid uncertainty about others. This concept includes three notions: how we generate information about others, how uncertainty is linked to anxiety and how uncertainty-reduction processes are linked to culture.

How much do we really know about the people with whom we socialize, the people with whom we work? Researchers studying uncertainty avoidance start with these questions and then ask: Why do we gather information about other people? What methods do we use? What will result? (p. 144). These questions could be altered during the information age to ask: How much do we know about the people who built the Web sites we are using? Or: How much do we know about the sites they built for us to view? What digital methods can be used to gather information about other people?

Uncertainty Reduction Theory

Upon encountering a stranger, we typically act differently than when we encounter a person with whom we are familiar. It is a natural reaction that we take for granted, but there is a reason for such a

reaction. Berger says people loathe uncertainty; they prefer to be able to predict the behaviors of others and the outcomes of their encounters with others. The normal coping mechanism for this dilemma is to learn more information about the other person. “Indeed, this kind of uncertainty reduction is one of the primary dimensions of a developing friendship” (Littlejohn & Foss, p. 145). People have the same types of “relationships” with new technologies and unfamiliar Web sites. They seek to reduce anxiety by learning more about the site or the digital tool.

Anxiety Uncertainty Management Theory

This theory “attempts to explain interpersonal and intergroup communication” (Asante and Gudykunst, 1989, p. 24). Intercultural communication is “viewed as a special case of intergroup communication.” By taking cultural variability into consideration, Gudykunst looks simultaneously at intercultural communication as well as “cross-cultural variations” (p. 24). When one is in a relationship and is able to reduce uncertainty or anxiety he is better able to adapt and to be a more effective communicator. Gudykunst (1988) looked at when interpersonal and intergroup “factors” play a role in decreasing uncertainty and anxiety. Reducing uncertainty is a cognitive process. Reducing anxiety is an affective (emotional) process. The factors which Gudykunst says affect uncertainty include: “ethnolinguistic identity, expectations, group similarity, shared networks, interpersonal salience, second-language competence (or more generally, communication competence), and personality factors (i.e., self-monitoring, cognitive complexity, and tolerance for ambiguity).

There are six assumptions in Gudykunst’s theory: There is at least one stranger in the group; the stranger feels insecure; the stranger’s behavior is highly evident; anxiety and uncertainty are distinct concepts; both interpersonal and intergroup factors impact all communication; and finally, strangers are too quick to attribute one’s behavior toward them to that person’s membership in the group, as opposed

to that person's status as an individual (p. 25). The theory includes 13 axioms, each relating to how an increase or decrease in one factor (or factors) affects uncertainty and anxiety (p. 25). This theory is relevant to research about online social networks. With sites like Facebook and Myspace so popular, how people communicate on the World Wide Web is a popular research topic. As opposed to online bulletin boards, these sites are graphically intense. Depending on the user, the presence of graphics either increases or decreases uncertainty.

Critical Theory (Habermas)

This is a tradition of research that studies society in terms of work, interaction, and power. "All three are necessary and ... inseparable from the human condition" (Littlejohn and Foss, pp. 145-146). Littlejohn and Foss introduce critical theory by asking the reader to ponder his or her station in society. Where one sits in the pecking order and how one got there are important questions; how communication influenced one's power or lack of it — one's status or lack of it — in society. Whenever political leaders get together, the most important person sits at the head of the board table and the others sit to his or her left or right, with the most powerful (and perhaps hardest working) subordinates sitting closest. Such a table is a visual metaphor for poor communication, making it easier for some ideas to get heard somewhat better than others. It has long been said that the World Wide Web democratizes communication processes. When 10 people have access to the same information online, there is no power center. In countries like China, Egypt and Vietnam, however, the power center offline and the online power center are the same entities.

Critical theory has its roots in Europe and intermingles its branches with post-modernism, American feminist theory and post-colonial discourse (Littlejohn and Foss, p. 47). The theory has three basic tenets: It questions authoritative ideologies that have been taken for granted. It has a tradition of

employing researchers interested in lifting the oppressed up and giving them freedom, or at least a voice. Finally, it melds theory and action, in an effort to accomplish change (p. 47).

Communication is the “coordinator of society” (Habermas, 1986, p. 314). Habermas argues that humans exist “through the socially coordinated activities of [their] members and that this coordination is established through communication” (Habermas, 1986, p. 397 in Yapple and Korzenny; p. 296). Thus communication travels between individuals and entities in society like packets on a network in a world that is increasingly wired. When one’s values are introduced — coupling with their knowledge and influencing their attitudes to create behaviors — we begin to influence other people, including their opinions of ourselves (p. 296-297). The subject matter of the communication provides the work. The power is provided by the technology or distribution method that provides the communication. Yapple and Korzenny (1989) refer to the power of satellites, but the power could easily have been assigned to the Internet. They argue that through such technology, we may introduce values that are “totally inappropriate” in the receiver/target country. The cultural differences may be intracultural, as with differences between people from California and New York, or intercultural, as with differences between people from the United States, where sexuality is typically promoted, and Arab countries, where sexuality is typically kept hidden.

Critical Theory (Deetz)

Employees go to work every day and expect to be treated fairly, at the very least. Some like their jobs. Others do not. For some, it is “just a job.” A primary reason for how one feels about his or her job is the atmosphere created by management. Is it a top-down dictatorship? Are line employees discouraged from making key decisions? With its large economy, the United States has a number of corporations that have gross products larger than that of whole nations. Externally, such organizations

wield this tremendous economic power while also having little or no accountability for their actions (Deetz, 2000). Private corporations are regulated by government agencies concerned with their respective industry. They also pay corporate taxes. American corporations, which are traded publicly on the stock market, have those two restrictions. The Securities and Exchange Commission governs some of them. Other government agencies provide regulation as well. But when government fails to do its job, abuses can mount. It is when abuses mount from a labor perspective that morale slips and organizational development experts see an opportunity to study an organization's corporate culture. Internally, most organizations seek to gain as much advantage from the labor of their employees as possible, thereby creating a confrontational environment where process rules over content and politics is as important as productivity.

Deetz's critical theory acknowledges the dominance of multinational corporations over other societal institutions in an attempt to "help the communication practices in organizations that undermine fully representative decision making, thus reducing the quality, innovation, and fairness of company policy" (Lane, 2001, February 14b). Using Deetz's critical theory as a basis for their research, organizational communication scholars "diagnose distorted corporate decision making" and use communication to create working environments that are both productive and democratic (Griffin, 2003).

Online services such as Internet service providers and companies that build Web sites are interesting companies upon which to conduct an organizational communication analysis. These companies typically have three arms: a content arm, including writers and graphic artists; a technical arm, including programmers, who write the software programs that run on the site, system administrators, who keep the site online, and producers, who upload material and have the least technical skills in this group; and a marketing arm, including advertising and public relations

professionals. Managing these diverse people is a challenge. There is usually a broad mix of personalities who differ on whether (or not) content is king.

Cross Cultural Adaptation

This is the notion that immigrants who participate in activities in their new homeland adapt faster than those who do not participate (Lane, 2001, February 19b). Whether one is talking about short-term travel across a border or a long-term stay abroad, the tendency of some visitors in foreign lands is to cling to familiar people, accents, languages, places and food, rather than indulge in the things that make that country different from our own. But failure to assimilate lengthens the time it takes one to adapt to a new culture. Morgan (1972) looked at the adaptation rate of 44 American college students in Basel, Switzerland. Attempting to study the “personal and educational growth and development of the participants,” Morgan asked how study abroad and other similar educational experiences affect students — and was focusing on three things: how the students’ values and attitudes changed while in the foreign land; the students’ own evaluation of the study abroad experience; and patterns of adaptation. Morgan used observation and questionnaires and “value-attitude scales” while incorporating social psychology and anthropology in the research. Three value-attitude scales were administered before and after the experience. Data showed that while group change was minimal, individual change and change related to student groupings (by similar type) was “extremely high” (Morgan).

When an individual fails to adapt to the health care system in his or her own country, this can have serious ramifications for the health of that individual. Communication problems are abundant when immigrants need health care. One of the reasons for not seeking medical help is the language barrier. This can happen to immigrants in developed countries as well as native-born people in countries such as

India, which has two official languages, Hindi and English, and 22 official “scheduled” languages (Gordon, 2005).

Face Negotiation

How do we feel when we are around other people? Are we confident, scared or angry? Face negotiation theorists study this question. Their work is based on the idea that while some cultures handle conflict by seeking negotiation first, people in other cultures feel a need to dominate (Lane, 2001, February 14c).

Edward T. Hall

The people who comprise each culture share common history, identity, language, non-verbal communication, material culture and “ways of doing things” (Hall, 1976, p. 1). The dominant cultures of the Western Hemisphere are increasingly realizing in the 21st century that the cultures of low-income countries — whose history, identity, language, non-verbal communication, material culture and “ways of doing things” have long been suppressed by colonialism and capitalism — are now seeking more than a sharecropper’s share. They want equality in the global economy, or at least to not be exploited. Hall called for “a massive cultural literacy movement that is not imposed, but which springs from within” (p. 7). Hall envisioned a world wherein people had a “deeper knowledge of one another and were not “ranked” (p. 7). He writes that many roads lead to what he calls truth. No culture has the correct notion of what truth really is. Hall notes that “Western man” in particular believes that his approach to logic is the most logical approach. To highlight and denigrate Western priorities, Hall chides bureaucracies for their “mindless persistence” and “institutionalized necessity to control” the world around them. How would a New York City or Washington, D.C. bureaucrat fare in a low-income country? This is a fair question because Western intergovernmental and non-governmental officials often file into low-income

countries to manage funds allocated by the United Nations, the World Bank, USAID or private organizations such as the Gates Foundation. Aid workers should be trained to think comprehensively rather than linearly, which is how, Hall says, “we have been taught to think” (p. 11).

Given our linear, step-by-step, compartmentalized way of thinking, fostered by the schools and public media, it is impossible for our leaders to consider events comprehensively or to weigh priorities according to a system of common good, all of which can be placed like an unwanted waif on culture’s doorstep (Hall, p. 12).

Americans in business have long debated which is more important: process or content. How a meeting is structured is more important — to some — than what is accomplished in that meeting. A similar debate exists in the relationship between intercultural communication and business. Consider manufacturing. Many people in the West privilege the “content or meaning” of a product over the way in which it is designed and manufactured, how it works and why it is needed in the first place (p. 14). People in Asian cultures privilege the “process” and concepts such as total quality management have emerged from there. But it would be insufficient to generalize about cultures and not look deeper. One may have surface beliefs, but beliefs are often altered by events. Looking deeper can “change our view of human nature” (p. 15). One way to look deeper is to study a culture’s language. Speaking is a surface act but certain facets of the language one speaks act as a cultural map. Hall learned this by studying Navajos, whose language is complicated, but considered an “essential element of the life, culture and identity of the Navajo people” (Goodluck, Lockard and Yazzie, 2000). Even with all of the differences that cultures have (even adjacent ones), anthropologists have agreed on three common characteristics: 1) Culture is not innate. It is learned. 2) Different aspects of one’s culture are interrelated; and 3) People in a community share their culture and it defines them (p. 16). Hall describes culture as “man’s medium”

and says that it is pervasive. Throughout the day everything one does or says is the result of what she has learned. It is related to something else she did, said or learned. And someone else in that culture would do or say something similar.

M Time and P Time

Hall writes about monochronic time and polychronic time to describe the differences regarding time and space between Western and low-income countries (p. 17). Western countries are on M-time, which “emphasizes schedules, segmentation and promptness” (p. 17). Latin American and Middle Eastern countries are on P-time, wherein “several things are happening at once” (p. 17). P-time countries emphasize participation by individuals and completion of tasks rather than maintaining strict schedules. People from M-time countries are “stressed” when traveling overseas in P-time countries, Hall writes, because pre-set schedules are not adhered to. Relating these concepts to the present study, one asks several questions: 1) What are the ramifications of having Web developers from M-time source countries work with developers in P-time target countries to build Web sites to be accessed by health workers in the P-time countries? What about the feedback sent from target to source? Are the developers aware of the target’s status as members of a P-time culture? Do they care? Is their site designed in a top-down, “exporting” fashion or does it exchange information with users? Considering that Web sites can be updated at any time, P-time health workers may miss important information if they do not check certain sites on a regular basis. Also, consider that many health sites are not updated frequently and/or archive their material regularly. This adds to the problem of cultures in conflict about time.

Hall writes extensively about extension transference (p. 28). In his formulation, extensions are tools, both tangible and intangible, that people use to help them cope in society (McLean, 1981). Language and laws are extensions/tools. Music and the arts are extensions as well. The World Wide

Web is an extension that helps us in many ways, and the hardware and software it uses are extensions/tools as well. The questions here are how, when and where are the Web sites that are linked off Essential Health extensions for the health workers?

An extension replaces the process extended. Hall calls written language “a symbolization of the spoken language” and a “symbolization of a symbolization” (p. 28). McLean calls verbal language “an extension of our basic thought.” Web sites and distance learning are extensions of classroom instruction. They replace classroom instruction. These extensions are different from extensions that are signs, such as the sign with a white H on a blue background that symbolizes the proximity of a hospital. The former is learned after comparing and contrasting classroom instruction with online instruction. The latter is an abstract marking which people learn to acknowledge as indication of a hospital nearby.

Cultural differences could be present in the content of health sites, but the differences might not be evident to the Web developers who created them or the health workers who use them. Hall writes about Whorf, a chemist who studied how people in different cultures can interpret a word or phrase differently. A gasoline canister may be empty on one continent, but that same can is full of fumes on another. A skull and cross bones may mean “Poison” in one culture, but it may mean mortuary science elsewhere.

Textual Style/Technical Communication

One can have a subject matter, and an audience, and even a technology through which to present the material. But *how* one presents the content — his textual style — also is an essential ingredient toward creating text that readers will find useful. Medical writing, the textual style in the present study, is a form of technical communication. Many technical communicators adhere to standards adopted by the Institute of Electrical and Electronics Engineers, Inc. (IEEE), the Society for Technical

Communication (STC) and other organizations. Despite these standards, some technical communicators may learn that users find their products too confusing to comprehend. “It’s obvious to me that there is widespread ignorance of the most elementary principles of good technical textual style as laid down decades ago by such great teachers of writing as Rudolf Flesch and Robert Gunning, to name just two” (Cohen, 2000). Consumers do not complain about poor grammar or bad spelling in manuals and documentation. Rather they “are complaining that they cannot understand what they have to read or listen to in order to use the products” (Cohen). In the title of a brief paper, Cohen asked, “Can the Computer Improve your Writing Style?” Cohen states that technology cannot solve this problem. Spellcheckers cannot correct poorly written content. Well-written documentation is likely to be understood on first reading. Unless the technical communication industry wants to become a permanent target for critical trade journal articles and Dilbert cartoons, it will alter its procedures. He sees three basic problems: An overuse of acronyms (and abbreviations); an overuse of abstract nouns; and an overuse of passive verbs.

Practical Approach

Once these basic problems have been overcome through lessons learned, presumably in undergraduate university courses, the technical communication student will begin a quest to become an effective and efficient professional technical writer, or engineer known for his or her technical writing prowess. But success in the profession requires that one always adhere to practical principles of the profession, including proper grammar and punctuation, writing concisely, use of active voice, writing positive statements and avoidance of long sentences (Hibbard, 2004). To that end, some university-level technical communication courses are taught more from a practical than theoretical standpoint.

Successful professional technical communicators take a practical approach in their efforts to create documents that are deemed practical by users. Miller (1989) writes that

“*[b]eing* practical [emphasis hers] suggests a certain attitude or mode of learning, an efficiency (or goal-directedness) that relies on rules proved through use rather than on theory, history, experience, or general appreciation. Practical rhetoric therefore seems to concern the instrumental aspect of discourse — its potential for getting things done — and at the same time to invite a how-to, or handbook, method of instruction. Technical writing partakes of both of these dimensions of practical rhetoric” (In Fearing and Sparrow, 1989, p. 14).

Regardless of the discipline in which the technical writer is communicating, the guiding principal always should be to provide information that helps users to “complete real tasks” (Sherry and Wilson in Carliner, 2002, p. 20). This requires a willingness to try new things in order to achieve “valued human performance” (p. 20).

A Changing Role

In his biography on the STC Web site, former Society for Technical Communication (STC) communications director Maurice Martin drew on the analogy of a pilot who becomes an air traffic controller, to explain how the role of technical communicators will change in the future (Society for Technical Communication, 2008). It is an apt analogy because the information age has spawned a business environment wherein far more information is flowing in than anyone can possibly use, but only relevant information should be utilized in technical documents.

In addition to being writers, technical communicators serve as editors — or gatekeepers — as well. Moreover, technical communication has become a group effort. Over the past few decades, technical communication has evolved from a field in which solitary writing was the primary focus to one in which human interaction and knowledge creation in the workplace are important as well (Wojahn, Dyke, Riley, Hensel and Brown, 2001; Rainey, Turner and Dayton, 2005). “Collaborative competencies” and “people skills” head the list of technical communication abilities sought by managers, according to a survey reported on by Rainey, Turner and Dayton (p. 332-333) and cited by Hart and Conklin (2006, p. 395). Meanwhile, communication skills were “seen as a ‘given’ “ (p. 395). Albers (2005) follows the same theme in his introduction to the journal containing the Hart and Conklin article. He states that collaboration and project management have supplanted writing (p. 267). Others say the focus has shifted from product to performance (Hughes in Hart and Conklin, p. 1) and its practitioners need “social knowledge” to succeed (Sullivan, Martin and Anderson, 2003, in Hart and Conklin, p. 395). The term “technical writer” is outdated. Workers today are empowered to multitask. Hierarchical organizations are “too inflexible” to succeed in “today’s business environment” (Lawler, 2001, in Hart and Conklin, p. 395).

The optimal workforce today “requires effective relationships, clear communication, a spirit of initiative and a willingness to engage in respectful conflict” (p. 397). Because of this evolution, both intra-organizational, and cross-organizational communication, have improved dramatically. The way in which organizations “create and use knowledge” has also changed. According to Hart and Conklin, if technical communicators are uncertain about their roles, technical communication instructors must be frustrated keeping track of shifts in the profession as well. They advocate for a new way of looking at technical communication: “It is time that a new, more accurate and more helpful model of technical

communication was developed and accepted by the entire technical communication community (including employers, employees and academics), to help technical communication professionals better understand their emerging role and contribute more fully to the contemporary workplace” (p. 396).

What role would technical communicators play in this proposed new workplace? In 1998, they were encouraged to provide Internet communication services such as Web, FTP, and e-mail (King, 1998). More recently, technical communicators were encouraged to take the role of negotiators of technology, not unlike a change agent. A doctoral student in technical communication and rhetoric at Texas Tech University suggests that another new role for technical communicators might be creating podcasts that will communicate product information to end users (Barrow, 2005). So how should technical communication evolve? Reviewing the book *Reshaping Technical Communication: New Directions and Challenges for the 21st Century*, edited by Mirel and Spilka (2005), Staples (2003) points out that Borland believes the field should evolve into “interaction design.” By this he means technical communicators should become knowledgeable about how their product lines work and not be afraid to offer ideas or solutions to problems.

New Metaphors

Ellis’ book, *Communication for Engineering: Bridge that Gap*, “helps engineers learn to communicate effectively in professional situations” (Amazon, 2008). The subtitle is not surprising, as “many practitioners see themselves as the bridge between a technical and non-technical worlds that have no means of communicating with each other” (Chu, 2000). Technical communication has long been thought of as a “bridge” between those who invent and produce technology and those who purchase and consume it. But technical communicators have grown tired of that image, even calling it “misleading or even degrading” (Hart and Conklin, 2006, p. 396). While bridges passively allow traffic to flow from

one point to another, technical communicators are “active participants and contributors to complex human processes” (p. 396). Hart and Conklin suggest a new way of thinking about technical communication:

We strongly suspect that technical communication is now placing less emphasis on one-way communication through texts, and more emphasis on the creation of opportunities for two-way communication between those who create technology and those who implement and use technical innovations in specific workplace or social environments (p. 396).

Disdain for the bridge metaphor could be seen by laymen (or engineers or consumers) as an attempt by technical communicators to change their image, much like when the profession changed from being called technical writing to being called technical communication. But some say labeling is important. “It speaks to the issue of our identity, and by extension of that identity, our place and value in the corporate structure ... [as we] bridge the gap of two worlds that share no common language” (Chu, 2000).

Technical Communicators as Producers

According to Chu (2000), technical communicators “need to problematize the definition of information, re-evaluate our role in the information food chain as both information producers and consumers, and re-examine how and why we produce information” (Chu). The author asks whether technical communicators actually add value in the technology “food chain” by transforming complex information into data that users can comprehend. Chu answers his own question by referring to technical communicators as “brokers,” “middlemen of information” who “add value by facilitating a communication transaction. Chu asks whether, if producers became adept at communication or users became adept at technology, there would still be a role for technical communications. He asserts that

neither of these possibilities will come true and there will always be a role for technical communicators. Chu states further that technical communicators are not seen as producers because of their limited backgrounds in the technical fields about which they write. For example, he states, medical writers may not be qualified to make important contributions to the profession (Chu). This notion is an important element of the digital research cycle. Is the content accurate? Is it up to date? The answers to these questions are more likely yes if the technical worker has health-related experience and can write in a style considered usable by medical professionals. But if technical communicators do not master their subject matter, and only make small contributions to a project, their status as producers will not be acknowledged.

Technical communicators occasionally are forced to justify their positions in firms or are maligned for their role. The industry-wide adoption of the term “technical communicator” helped give a broader definition of what people in these jobs do. Some technical communicators went another route, preferring to be called business analysts or information architects (Chu). The stigma of being “just a writer” is unacceptable to some. Further, technical communicators who freelance are now “consultants.” To truly add value, Chu writes, technical communicators need to stop thinking of themselves as interpreters and start thinking of themselves as producers. This is an odd argument; as if simply by having a different outlook on their jobs, their roles will change. Meanwhile, the explosion in computer graphic arts and the World Wide Web over the past 15 years has been a boon for technical communicators, Chu writes. Indeed, a University of Denver Career Center Web site lists computer manual designer, desktop publisher, graphic designer, graphic artist, information designer, instructional designer, media designer, medical illustrator, multimedia designer, Web page designer and Web page

developer as fields related to technical communication. The forgotten element in Chu's paper is that many people who perform these jobs not only have design skills but also can write well.

Chu then points out an important dilemma for technical communicators, and all other information sources: the Internet has made much information free. How much does that affect technical communicators? "While their quality is not guaranteed, valuable information is there for the taking [on the Internet] if consumers are willing to dig and filter out the information noise," he writes. In 2003, Highby and Cain (2003) wrote a paper predicting what technical communication would be like in 2013. Among the responses to their survey of practitioners: learning new technology promptly will perhaps be the most important skill. The second most important skill will be collaboration in the workplace. Other skills and trends that will be important include the writer's ability to "assimilate" quickly to new working environments, structured writing (chunking), and skill diversity. Highby and Cain further state that in 2013 technical communication skills "will continue to drive employment requirements" and that the most important skills will be technical, people and investigative. Workers will also need the "ability to assimilate ... and meet changing customer needs" (Highby and Cain). Other thoughts about the future from the survey: People will continue to use paper; and hardware will continue to get cheaper while the devices they run will continue to get smaller.

Despite the dot-com bust, the authors are optimistic. They offer three conclusions about technical communication in 2013: 1) technical writers will continue to be in demand because the learning curve regarding new technologies will be too great for other writers; 2) Even though they will not be computer experts, technical communicators will continue to be in demand because of the perception that engineers and designers cannot write well; and 3) as new technologies develop, and as industries not involved in the 1990s boom recognize the value of technical communicators, more will be hired (Highby and Cain).

In a paper she presented at an STC conference, Ames (2002) notes that trends in society and industry have changed the role of the technical communicator. Specifically, usability and product design became more important, computers were becoming more “ubiquitous,” users were becoming more disgruntled than ever about poor user experiences, and “traditional deliverables [were] not working” (Ames). Ames states there are three realities that many users must face when attempting to accomplish a task. They have a job to do. They have a tool but they do not understand it. They rely on documentation to learn how to use the tool. She says some products offer “information-rich interfaces” such as Intuit’s Quicken and Turbo Tax and Microsoft’s Money. “The information that appears in these interfaces is the work of technical communicators. And the overall design of these products is greatly influenced by these same communicators” (Ames).

If one were to create a technical communication team within a firm, how would she begin? Ames recommends that practitioners become knowledgeable about the following concepts: Technical communication has evolved into a task-oriented, team-oriented, “user-centered design and development process” (Ames). The group focuses on the needs of perceived individual users, not the needs of designers, manufacturers, wholesalers or retailers. Usability is an important element of technical communication. Ames recommends that usability include more than just testing. It should be a part of the entire “lifecycle” of the product. Human factors also plays an important role in technical communication. It is important to understand principles of cognitive psychology in order to understand users. Understanding users is a concept that the digital research cycle stresses. The next step is interactive design. According to Ames, what we know about how users interact with products enables designers to “think consciously” about how products will interact with users. Finally, information

architecture and design play important roles. Ames stresses the importance of recognizing the difference between “designing information for user interfaces vs. Help and printed materials” (Ames).

International Technical Communication

The communication of information has long been considered a top-down process. From Shannon and Weaver’s model of the sender-receiver process (Littlejohn, 1989, Pp. 42-46) to Hoft’s important text, *International Technical Communication: How to Export Information About High Technology*, the tendency has been to state that information is exported from sender to receiver, from source countries to target countries. But that view is changing. “Current thinking in information development stresses the importance of exchange — information flow is by no means a one-way flow from north to south” (Neil Pakenham-Walsh, personal communication, 2004). Hoft states that technical communicators need to learn how to adapt to a world in which they will increasingly be working with new partners and translators. She advocates introducing them to linguistic theory “to instill an understanding of the issues involved when working with these new partners” (Hoft, 2002). At the heart of linguistic theory are phonology, morphology, syntax, and semantics. The focal point is the properties of “grammar, a system of rules that characterize the phonology, morphology, syntax, and semantics of a natural language” (Lawrence University, 2004).

Trends

Writing in 1995, Hoft enumerates more than a dozen trends in international technical communication, trends that she says began around 1990. The first is that software engineers respond more promptly to issues related to international consumers than do technical communicators. A number of software products, she says, have been re-engineered for international audiences, while technical

communication “products” have not (Pp. 3-4). Secondly, technical communicators often use “restrictive grammars,” also known as controlled English. They use restrictive grammars in order to better facilitate machine translation and to accommodate people for whom English is not their first language. However Hoft says there is no empirical evidence that this step is beneficial (p. 4). Meanwhile, technology companies are buying machine translation equipment to use “in conjunction with restrictive grammars” (p. 4). The makers of this software strive to reduce dependency on professional translators by creating products that reduce the need for human post-editing. Hoft writes that — in 1995 — this goal has not yet been achieved and that the software’s cost is prohibitive. Perhaps, once the quality of the software improves, it will become more cost-efficient. In the 21st century, professional human translators would seem to cost more than software.

There are many technological restraints associated with software. Chief among them is cultural assumptions about work environments. For example, in many countries, workers share computers. This decreases productivity (p. 4). Hoft’s fifth point is central to this dissertation. She states that international technical communication benefits from a multidisciplinary approach. Fields such as cultural anthropology, professional technical translation, cross-cultural communication and linguistics play a role in the success of technology, she writes (p. 4). High tech products often require documentation. Hoft’s seventh trend is that the companies that make these products are beginning to hire technical communicators to generate product information. But she states that this is not true in most countries (Pp. 4-5). Rather, she says, it is neither a recognized vocational specialty, nor a university subject, nor a profession. Where no technical communicators are present, engineers and administrative assistants generate the content. Still, she says, information is quickly becoming both a user and a legal requirement (Pp. 4-5).

Large software companies must standardize training so that their products are “world ready,” Hoft says (p. 5). One key to doing this well is giving accurate information to technical communicators, who create the documentation used in training (p. 5). Meanwhile, consumers in low-income countries expect to be treated the same by multinational companies as they treat the consumers in developed countries (p. 5). Also, they are short-changed when products are released without proper testing for usability of cultural variants, such as in documentation. When a problem exists with the source product, the problem may be repeated in similar products created for different cultures. Hoft states that “short product-development cycles” lead to these challenges. When five or more countries are involved, she says, a significant amount of time and funding is required to test the target variants. Customization has reached labels, which now must be written in the language of target countries as a protection against liability law problems that are growing in popularity (p. 5).

Localization

When a product is created or adapted to match the needs of a particular culture, that product has been localized. Localization can be either general or radical. General localization occurs when superficial cultural differences are the focus. Radical localization occurs “below the surface” (Hoft, p. 11). It is the result of adaptation of a product that affects the way users “think, feel and act” (p. 11). Which type of localization works best for a company is a decision made based on the company’s “economic goals” and how much is understood about the cultural differences of the target cultures (p. 11).

Internationalization

Internationalization is “the process of re-engineering an information product so that it can be localized easily, for export to any country in the world” (Hoft, Pp. 18-19). She states that any internationalized content contains two elements: core information and international variables. Core information is similar to the “lowest-common denominator.” It is “invariant,” constant, unchanging, regardless of the culture into which it is introduced (p. 19). Hoft cites five benefits to internationalization. If one separates core information from culturally variant information, the amount of localization needed for the product will be reduced. Some aspects of a product or a product family, such as Terms and Conditions, will not change. This reduces translation costs (p. 20). One can eliminate a product’s cultural bias by identifying core information. As an example, Hoft cites use of variant currencies in household budgeting software. Other examples she cites are colors, date and time formats, units of measurement and product packaging (p. 21). Hoft also cites textual style, which is part of the digital research cycle. But she also includes graphics as a variant, after having included graphics as core information. Perhaps distinguishing the role graphics plays is a key factor in each project. Finally, internationalization allows for simpler division of tasks by a project team, because the core information can be compiled once and used many times. Content written about international variables also can be reused (p. 21). Core information is used for a long period of time. Hoft states that it should be sizeable, such as a book chapter, training module or a graphic image.

Globalization

While internationalization is a cumbersome, two-step process, and localization is profitable, but only for a while, Hoft says, companies can opt to create products that appeal to a global audience.

Global products have “universal appeal.” How and why they are to be used can be understood by people

in any culture (p. 23). Ancient examples of global products include air, earth, fire and water. Most everyone understood how to use them. Modern examples cited by Hoft include paper clips, nails, pencils and safety pins. Global products are used without modification. Some signs, such as handicap, poison and stop signs are considered global products (p. 24), although, as mentioned above, the skull and crossbones together are a symbol for mortuary science — not poison — in some cultures. So while a localized product might be airplane passenger safety instructions printed in one target language, its globalized equivalent might be the same product with instructions printed in multiple languages (p. 25).

Concurrence

Imagine the cost-savings if an international product could be localized automatically. That is one goal of companies that engage in concurrent engineering, one way to tackle “the integrated, concurrent design of products and their related processes, including manufacture and its support.” Automating documentation localization is particularly difficult with Asian target countries because of the multiple-byte languages prevalent in those countries (p. 26).

International User Analysis

Technical communicators who are tasked to write documentation for a company that exports its products to target countries around the world should first conduct international user analyses of those countries. There are many benefits to conducting such an analysis. One would be able to determine if/where translation is necessary and “which media to use to present the information” such as printed manuals, online documents, CD-ROM productions, standup training or video (p. 41). Determining which technology to use in each culture is one aspect of the digital research cycle.

Hoft quotes Sweezey (1994) who states that another benefit of conducting international user analyses is that while the general nature of a country's culture does not change much over time, events cause some changes to be necessary. One example is language. There has been more demand for Mandarin speakers in Hong Kong — where Cantonese is the official language — since 1997, when China took over the country. Similarly, since immigration of Hispanics increased in the United States, there has been more demand for Spanish-speaking people here. When Japan's economy was competing effectively against the United States during the early 1990s, many people believed it would be necessary for American business executives to learn Japanese.

There are five steps for conducting a successful international user analysis: “research international variables; choose a model of culture; analyze the completion; identify international resources; and synthesize the data” (p. 58). After conducting an international user analysis, Hoft says, one will be able to choose among international variables that are a good fit for one's company's needs. They will be able to distinguish international resources from each other and from domestic ones. They will be able to generate a log of cultural data from international resources. They will be able to distinguish between two or more cultures, citing similarities and differences. They will be able to take the cultural data they have accumulated and apply it toward a “model of culture” or community. They will be able to generate a profile of the culture of the target users' country. They will be able to conclude how much localization is necessary in order to make the product successful in the target country. Finally, they will be able to use this data to localize the product for the target culture (p. 58).

Cultural Bias

One of the most significant problems in producing material that meets the needs of customers from varying backgrounds is the introduction of (and identification/isolation of) cultural bias.

Sometimes translation alone is not enough. Time and cost are two reasons bias is introduced. When the documentation describing a product is written identically for two cultures — only the languages are different — the documentation may contain bias toward one culture or the other. Translation should not be confused with localization. Language is a significant difference between consumers from different regions but it is not the only one. Geography is a factor as well. “Japanese and German cultures are very different” (Hoft, Pp. 119-120). She cites Hall and Hall’s statement that ““90 percent of all communication is conveyed by means other than language” (Hall and Hall, 1990, p. xiv, in Hoft, 1995, p. 120). Hall and Hall were referencing other cross-cultural communication specialists who say that non-verbal communication accounts for the 90 percent. The dilemma online is determining the means by which communication is best conveyed without cultural bias, i.e. having a subject matter and an audience in hand, what are the optimal textual style and technology?

Design Issues

Hoft lists five essential criteria for printed or online international design. Four are related to ease of use. One is related to culture. The first four are: 1) It must be created in such a way that localization and translation are possible with minimal effort. 2) It must be created in such a way that redundancy is minimized because redundancy adds to the cost of translation. 3) It must be created in such a way that localizers and translators find it to be “flexible, accommodating, and ... more cost effective.” 4) It must be created in such a way that usability is maximized. The fifth criterion is: It must be created in such a way that the target audience’s cultural expectations are met (Hoft, p. 137). Hoft reviewed “some of the more popular information designs” between 1985 and 1995 and came to the conclusion that “no one design to date addresses all the complex design requirements for international technical communication”

(Pp. 137-138). Are the developers of the Web sites linked off Essential Health Links attempting to meet the cultural expectations of their target audience? That question is part of the survey herein.

Hoft looks at five types of publications to show how they address technical communication issues. Modular publications are manuals in which “one large, complicated manual” is treated “as a set of many, small, independent manuals.” Technical communicators decry the amount of repetition included in each of the smaller manuals (p. 138). Task-oriented publications supplanted modular manuals. Software companies prefer this method, Hoft says, but she questions whether it is optimal for situations where localization and translation are involved (p. 138). Alphabetic reference manuals are popular in the United States. They are designed like dictionaries and encyclopedias and include much detail (p. 139). Minimalist publications were the trend in technical communication in 1995. Hoft cites architect Mies van der Rohe, who said, “Less is more.” In present terms, this popular phrase means less content in the documentation is preferable to more content. Let the readers “learn on their own,” Hoft writes (p. 140). Use of a minimalist approach also allows the user to apply his or her learning style to the situation.

Learning Styles

Kolb learning style theory names four learning styles: divergers, assimilators, convergers and accommodators (Sharp, 1997). Learners or — in this scenario — consumers, can learn (manipulate products) in any of the four styles, but typically prefer one style above the others. Divergers would ask, “Why would I need this product?” Assimilators would seek to learn the facts known about the product. Convergers would ask, “How can I use this product?” Accommodators would ask, “What would happen if I spontaneously manipulate the product?” Based on the information above, technical communicators who advocate a minimalist approach

seek consumers who are accommodators, those who “learn by concrete information from their senses (feeling) and doing” (Sharp).

Writing Issues

Hoft cites a number of writing issues. Among them are the structure of language, the graphic depiction of language (i.e. writing and writing systems), the application of controlled languages, language structure problems (in English) and language media problems in English technical communication.

CHAPTER THREE: METHODOLOGY

“Information that describes high technology must contain technically accurate information. The integrity of the information depends on it.”
— Nancy Hoft

Part I: Introduction

In this chapter I will present information about the survey and the plan for implementing it. Essential Health Links is a gateway site on the World Wide Web with links to approximately 700 Web sites devoted to health information. The sites are designed for health workers in low-income countries (approximately 500 sites) and developed countries (approximately 200). Rhine, a university librarian emeritus, compiles, updates and maintains the Essential Health Links, which are linked off the AED/SATELLIFE Web site (Academy for Educational Development/SATELLIFE (2008a). Pakenham-Walsh, a medical doctor and coordinator of the Global Healthcare Information Network, is editor of Essential Health Links. In 2003 the Health Links were linked off another Web site (International Network for the Availability of Scientific Publications, 2008a). INASP had six criteria, of which Web sites had to meet five to be eligible to be linked off the gateway. AED/SATELLIFE has the same criteria today.

Rationale for a Survey

In 2003, when Rhine was in Gainesville, Florida, this researcher contacted him about a matter unrelated to INASP Health Links. During these initial e-mails, Rhine made a compelling case that someone should conduct survey research to determine whether developers of the Web sites linked off INASP use best practices when building and maintaining these Web sites. These surveys could be administered in one of three ways: 1) through e-mail contacts and HTML

surveys; 2) through face-to-face interviews; or 3) telephone surveys. Because of the location of the population of Web developers linked off INASP (North America and other continents), face-to-face and telephone interviews were deemed impractical. A survey was deemed more appropriate. Patten (2002) writes that, “a quantitative researcher would tend to spend a small amount of time directly interacting with the subjects (largely because the nature of her instruments do not require it)” (p. 19).

However, due to the relatively small size of Web developers to be studied, it was determined that a cross-sectional survey (a snapshot) of the population of Web developers — not merely a sample — would be an ideal research method. It was further determined that this researcher should undertake the project using e-mail contacts and HTML surveys, and that follow-up e-mails would be sent to developers who did not respond positively to the initial requests for participation in the survey. It also was determined that the survey instrument should be original, rather than an existing or modified instrument created and used by other researchers in the past. From surveys, one can get a “quantitative or numeric description” of a population’s attitudes or opinion, or trends within that population. Most surveys “generalize from a sample to a population” (Babbie, 1990, in Creswell, 2003, p. 154). For this research, it was decided that an attempt would be made to send an e-mail — containing a link to the survey — to every Web developer who has a site linked off the Essential Health Links — i.e. the entire study population. Finally, Rhine and Pakenham-Walsh determined which of the 700 Web sites are designed for health workers in low-income countries prior to this research, and labeled them as such on the Essential Health Links site.

Instrumentation

Because this survey has never before been used (the instrument is original), it will not be possible to “describe the established validity and reliability of scores obtained from past use” (Creswell, 2003, p. 157). The goal is to establish the new instrument as valid, i.e. that one can take the scores from the survey and derive “meaningful and useful inferences” (p. 157). There are three primary types of validity, plus one secondary type: Primary: Content validity — Does the survey measure Web developers’ attitudes about best practices? To establish the content validity of the questionnaire it is important to conduct a pilot test. One could consider the present survey a pilot test for future research of these same Web developers. Predictive validity (aka criterion-related validity) — Does the survey correlate with the results of future surveys or other measurements of Web developers’ attitudes? This will have to be determined after future research. Construct validity — Does the survey measure hypothetical concepts or constructs such as the hypotheses mentioned later in this chapter? (p. 157). Secondary: Face validity — Is this survey a legitimate instrument for measuring attitudes of Web developers? Is there a better way, such as interviews or ethnographic research? (Babbie, 1992, p. 132).

Questionnaire

Using Likert Scale items on a questionnaire is an ideal way to ask a number of questions about one topic, to get answers that can be compared with those of other Web developers and to have respondents answer a large number of questions in a short period of time. Below is an example of an item in the present questionnaire:

Strongly Agree Agree No Opinion Disagree Strongly Disagree

Because of the “unambiguous ordinality” of the Likert Scale, it is an ideal way to convert scale construction to index construction (Babbie, 1990, p. 180), to generate mean scores for a group of respondents on each item of the questionnaire in addition to mean scores on groups of items. For example, the answers above can easily be assigned numerical values (1-5) or attributes. Then a group’s collective score on each of the five responses can be summed. A researcher then may divide the sum — or total score — by the number of respondents, to calculate the average score (mean) on that item.

Postal Surveys

E-mailed questionnaires may one day remediate postal surveys, but until they do, postal surveys will continue to be the primary medium that market researchers use to reach consumers. Trochim lists two disadvantages: low response rates and the difficulty in providing respondents space to give open-ended responses (2001, p. 108). For this research, surveys were e-mailed.

Variables in the Study

It was determined for this study that the respondent pool should be only the developers of the sites built to be viewed in low-income countries. The key findings would be these Web developers’ attitudes toward the content on their site(s), whether they feel it is necessary to be culturally sensitive to the (health worker) audience and whether they feel it is necessary to consider technological limitations of the health workers’ computers and Internet access. How the Web developers answer each survey question is dependent on the factors that influence them.

A variable is a “trait or characteristic” that can be placed in two or more possible categories. There are two types of variables: dependent and independent. Independent variables cause dependent variables to take specific values. For this study, independent variables studied include: the Web developer’s attitudes toward the quality of the content on her site; her attitudes toward the cultural sensitivity of her site; and her attitudes toward the technological accessibility of her site. The dependent variables are the results of the statistical tests that measure differences between these three independent variables.

Content

Accuracy and timeliness of content on Web sites is vital, especially considering one of the attributes of the Web that hardcopy books and journals lack is the ability to be updated instantly and frequently. Web sites are analogous to live musical or dramatic performances in that the developer can change the content, the way the message is conveyed or the look of a site when the situation changes, or when she wants to elicit a different reaction from the audience. When new diseases or cures are discovered, it is important that they be included in the content on these Web sites as soon as possible. When new treatments have been discussed in hardcopy journals, it is imperative that these articles and papers also be published online. As news develops in low-income countries, such as the cyclone in Myanmar or the earthquake in China, the first responders must get information about the medical needs of the country online as soon as possible so that information can flow in both directions. The Web has another advantage over hardcopy books and journals. Sites can be changed when perspectives change. The 700 Web sites linked off Essential Health Links are divided into General Health Resources, Specific Health Resources and Library and Publishing Support. But they could just as easily be broken

down into these three categories: 1) Web Sites about Syndromes, Diseases and Other Ailments; 2) Web Sites about Diseases Related to Specific Body Parts; and 3) Web Sites about Diseases Common in Specific Regions of the World. This new perspective can be reflected online instantly.

When newspapers began publishing on the World Wide Web in the mid 1990s, a great debate began about whether they should publish their exclusive stories — those which no other news organizations were working on — online prior to publishing them in the next day’s newspaper. The argument by some reporters and editors was that they did not want their Web sites to scoop or “cannibalize” their own hardcopy product by publishing a story online before printing it in the next day’s newspaper. Over time, as these journalists began to realize the potential benefits of using the Web for aggregating content (Googling for research) as well as distributing it — and accepted its inevitability as a revenue-generating tool, they began to accept — and in many cases, embrace — the Web. While most newspapers began publishing online in the mid 1990s, academic journals appeared online more gradually. There are many more journals online now than in 1995, when the Web was in its infancy. Some of the sites linked off Essential Health Links have related print products. Others are online only but must choose how often to update their sites. They are poised to provide immediate and useful content updates. They have access to quality content and they have the technological wherewithal to disseminate it. But do the developers of these sites have the desire? They are facing a dilemma similar to that faced by journalists and academicians in recent years: “Should my information be posted online before or after it appears in print?” The survey herein asks Web developers for their attitudes toward best practices related to the updating of content on their sites. Do they agree or disagree with

statements that support the timely dissemination of health information? Quality content is the first topic of INASP's initial query with this researcher about Web developers who build sites to be viewed by health workers in developing countries.

Audience

On the surface, the cultural sensitivity toward an audience seems like an easy topic to research. Stafford, J.R., Bowman, R., Ewing, T., Hanna, J., & Lopez-De Fede, A. (1997) define cultural sensitivity as “being aware that cultural differences and similarities exist and have an effect on values, learning and behavior” (Mavropoulos, 2000). Another definition of cultural sensitivity is “[t]he state of being aware that there are many cultural differences between people” (Texas Department of State Health Services, 2008). Both definitions refer to “differences.” Indeed there are different degrees of accuracy (content), sensitivity (audience) and ease of use (technology) (the three focal points of the survey), just as there are many shades of blue and multiple marks on a thermometer. How a Navajo poet defines accuracy may be quite different from how a Detroit-based automotive engineer defines the term. Cultural sensitivity may mean, “Be the [visible, noisy] life of the party” in one community while in another it may mean, “Don't disturb the indigenous man's Gods [whom one cannot see].” Ease of use is another subjective term. For a student in Uganda, a Web page loading 30 seconds after being requested may be considered “easily viewed” whereas that delay may be unacceptable to an American Web surfer. Cultural sensitivity is the second topic of INASP's initial query about Web developers who build sites to be viewed by health workers in developing countries.

Technology (Distribution Method)

According to the United Nations, sustainable development is defined as “meeting the needs of the present generation without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987). In Africa sustainable development is hindered by poor technological capability. There is not enough training in the IT and ICT industries to match the economic concerns. Nor have government policies kept pace with these issues (United Nations Economic Commission on Africa, n.d.). The UNECA author cites two issues as “overwhelming:” 1) the problems caused by and facing globalization; and 2) Africa’s unwillingness to gain insight from the experiences of “Newly Industrialized Countries.” But the lack of insight does not stop there. If a Web developer creates a site for anyone — from health workers in low-income countries to a consumer buying soap — one of his primary goals should be that as many people as possible have access to the site. Developers should do research to determine the technological capabilities and constraints of the technology used by their potential audience. He may find that his audience has late-model computers and software and lots of bandwidth; or he may learn that his audience has older computers and software and very little bandwidth — or some combination thereof.

Information disseminated in this fashion is not the same as information published in a book or hardcopy journal. Because it must be transmitted electronically, there are many potential problems that can occur. In either the developed or low-income world, an inaccessible Web site is a failed Web site. Technology used to access the Web in Africa today is likely to be the same technology used five or more years ago in developed countries. And it is likely the same technology that will be used in that African village five years from now. It is not the Web

developer's responsibility to improve the user's technology, but it is his responsibility to create Web sites that conform to the technology that exists in the low-income country. Thus it is important to ask Web developers to what degree they consider the technology used by health workers in low-income countries when they build their sites. Are they willing to risk using a specific coding technique even though it may render a site unusable on an old computer and they may not reach their audience? Technology is the third topic of INASP's initial query about Web developers who build sites to be viewed by health workers in developing countries.

Connections in Research

After it was established that this research would include a survey of Web developers about their attitudes and knowledge of best practices when building sites for health workers in low-income countries, this researcher determined that links could be found between content, audience and technology, that these connections are related to communication theory and that the questionnaire for this research should be based on a review of literature that takes into account not just content, audience and technology but also topics that are formed by connections between these variables. Later this researcher visualized a method for plotting these three variables — content (aka subject matter), audience and technology — plus textual style (four equal sides) — as well as four other disciplines in this research created by the connections (four equal lines) — on an octagonal grid. Figure 13 shows how this model “denotes” relationships between these disciplines, as Fiske (1990, p. 30) states takes place in communication models.

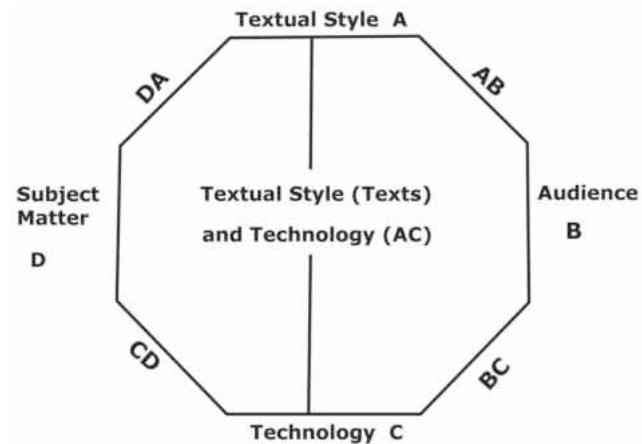


Figure 13. Four Areas of Communication

For this research, the subject matter is public health information. The audience — health workers in low-income countries — is represented by intercultural communication. The technology or distribution method is the World Wide Web — as represented by human-computer interaction. The textual style is technical communication. Connections that were found include: health writing is a connection between public health information and technical communication; international technical communication is a connection between technical communication and intercultural communication; cross-cultural user-interface design is a connection between intercultural communication and human-computer interface and public health informatics is a connection between human-computer interface and public health information. These relationships also can be described by research in those fields: Those who do research in public health and those who do research in human-computer interaction might also do research in public health informatics. Those who do research in public health and technical communication might also do research in medical writing. Those who do research in technical communication and intercultural communication might also do research in international technical communication. Those who do research in intercultural communication and human-computer interaction might

also do research in cross-cultural user-interface design. Realizing that these relationships exist helped this researcher to narrow the scope of this research, and expand it at the same time. It is narrowed because, for example, cross-cultural user-interface design is a more specific topic than intercultural communication. It is expanded because finding connections doubles the number of topics to study from four to eight.

Once these connections were recognized, it became apparent that a literature review for this research should include the eight topics. It was believed that studying all eight topics, rather than narrowing the focus of this research, would help this researcher write a better questionnaire. It is, of course, not unusual to write about a topic after conducting a literature review on that subject. Nor is it uncommon to base a survey on a literature review. However, in this case, the list of books and articles read during the review was based on a specific framework from which this researcher did not allow myself to stray. This researcher began by reading seminal texts in each of the eight fields represented by this digital research cycle. Among these texts were: public health, *Pathologies of Power* (Farmer, 2003) and *Mountains Beyond Mountains* (Ridder, 2003); health writing, *Health Writer's Handbook*, (Gastel, 2005); international technical communication, *International Technical Communication: How to Export Information about High Technology* (Hoft, 1995); human-computer interaction, *HCI Models, Theories and Frameworks: Toward a Multidisciplinary Science* (Carroll, 2003), and intercultural communication, *Cultures and Organizations: Software of the Mind*, (Hofstede and Hofstede, 1997). Through reading these texts, reading or studying dozens of other books and hundreds of Web sites, a 125-item questionnaire draft was created (Appendix A). This questionnaire includes 90 items related to content, 20 related to audience and 15 related to usability. Later a 23-item

final questionnaire (Appendix B) was derived from the 125-item questionnaire for use in the survey herein.

Part II: The Survey

To be successful a developer of a health-oriented Web site needs to be profitable, in most cases. She needs to contain costs. She needs to provide content that is not available elsewhere. She needs to ensure that everyone who accesses her site has a pleasant experience, in terms of the content quality, the cultural sensitivity of the site and the technical usability of the site. She wants users to return to the site often, daily if possible. She hopefully wants her site to be certified by the Health on the Net Foundation (HON). She wants to satisfy the ethical requirements that are inherent in running a health-oriented Web site designed to be viewed in multiple countries. She also hopes to minimize the legal liability of the content she is providing (Hoft, 1995, p. 3). In the quest to do all of these things, she makes decisions based on her attitude toward Web design, toward health care, toward her audience and toward the technology or distribution method itself. She also makes decisions based on combinations of these attitudes. Does she privilege the content over her audience? Is she especially concerned about being culturally sensitive — including concern about the language the site is presented in — but not concerned about the technology her audience is using? Is she a technophile who wants to use new technology on her site, even if viewing the site is impossible in the target country? Or does she care equally about the user's experience regarding content, culture and technology? These questions raise some other, more specific research questions and hypotheses.

Research Questions

Qualitative and quantitative research questions differ in that while qualitative research questions are broad (Creswell, 2003, p. 105), quantitative research questions focus a study in a specific way (p. 108). Research questions are common in quantitative studies, such as opinion surveys. The quantitative researcher's goal is to answer the research question(s). Quantitative research questions for this study might include: 1) Is there a significant difference in Web developers' attitudes toward meeting their customer's need for high-quality content and developers' attitudes toward meeting the cultural needs of their audience? 2) Is there a significant difference in Web developers' attitudes toward meeting the customer's need for high-quality content and developers' attitudes toward meeting the technological needs of their audience? 3) Is there a significant difference in Web developers' attitudes toward meeting the cultural needs of their audience and developers' attitudes toward meeting the technological needs of their audience?

Hypotheses

Hypotheses are "predictions researchers hold about the relationship among variables" (Creswell, 2003, p. 108). There are several types of hypotheses one could use: null/alternative and directional/non-directional. Null hypotheses typically predict no significant difference between two independent variables on an outcome (the dependent variable) (p. 109). Alternative hypotheses typically predict significant difference between two independent variables on an outcome (the dependent variable) (p. 110). Directional hypotheses typically predict differences in one direction or another, such as when one predicts that African Americans will get a greater degree of satisfaction from the election of Barack Obama as President of the United States than whites will get (p. 110). The independent variables in this research are the Web developers'

attitudes toward content, audience and technology. The dependent variables are the results of the statistical tests.

Null Hypotheses

There are three null hypotheses in this research:

1) There is no significant difference in Web developers' attitudes toward meeting the customer's need for high-quality content, and their attitudes toward meeting the cultural needs of their audience. 2) There is no significant difference in Web developers' attitudes toward meeting the customer's need for high-quality content, and their attitudes toward meeting the technological needs of their audience. 3) There is no significant difference in Web developers' attitudes toward meeting the cultural needs of their audience, and their attitudes toward meeting the technological needs of their audience.

Alternative Hypotheses

There are three corresponding alternative hypotheses in this research:

1) There is a significant difference in Web developers' attitudes toward meeting the customer's need for high-quality content, and the developers' attitudes toward meeting the cultural needs of their audience. 2) There is a significant difference in Web developers' attitudes toward meeting the customer's need for high-quality content, and the developers' attitudes toward meeting the technological needs of their audience. 3) There is a significant difference in Web developers' attitudes toward meeting the cultural needs of their audience, and their attitudes toward meeting the technological needs of their audience. Creswell recommends against using both research questions and hypotheses in a study (p. 109) because to do so would be redundant. This study tests the aforementioned three null and three alternative hypotheses.

According to the three null hypotheses, a Web developer who believes a customer should receive quality content also believes he deserves Web sites that are culturally sensitive. A Web developer who believes a customer should receive quality content also believes he deserves Web sites that work on old computers using low bandwidth network connections. And a Web developer who believes in cultural sensitivity also believes in technological compatibility. These beliefs can be determined by having Web developers fill out questionnaires. Below are the questionnaire items for this study. The first eight items relate to content. The next eight relate to audience and the next four relate to technology. The final three are demographics items.

Survey Items

The questionnaire in this research (Appendix B) contains eight items related to content (items 1-8), eight items related to audience (items 9-16), four items related to technology (items 17-20) and three items about the Web developer's/survey respondent's demographics (items 21-23). The questionnaire items in the present study came primarily from texts read as part of the literature review. Eighteen items incorporate the Likert Scale (Strongly Agree, Agree, No Opinion, Disagree, Strongly Disagree). There is an initial demographic question (not among the 23) that acts as a qualifier. It is designed to disqualify minors from participating in the research. This item asks the respondent whether he/she is at least 18 years of age. This item is a requirement of the University of Central Florida Institutional Review Board (IRB). Anyone who checks No on this online survey is sent to the search engine Yahoo! and is not allowed to complete the questionnaire.

Content

The first eight items regard the Web developers' attitudes toward content on their sites. The first item of this section of the survey (questionnaire item No. 1) asks whether it is important that these Web sites include a link to some sort of verification that the site contains accurate content. For most Web sites, it is not essential that they include verification of accuracy. After all, readers of many types of Web sites are smart enough to determine if a site is accurate and then make a decision to stay there or click off. But health sites are different. Mistakes in health care can be deadly. There are a number of ways to verify that a health site contains accurate content. One is for readers to look to see if a site has an HON accreditation logo (Figure 14).



Figure 14. The HON Code Logo

When a reader sees this logo, he should click on it. The accreditation is typically authentic if the reader is directed “to the personalized HON page presenting the Web site’s accreditation status” (Health on the Net, 2008b). The reliability and credibility of health information on the Internet are of primary concern to the Health on the Net Foundation, which promotes its Code of Conduct. Developers of Web sites that present health information should recognize the tremendous responsibility they have. With so many such sites available, readers now worry less about where to find information or help and more about the “relevance and accuracy” of that help (Health on the Net, 2008c). Sites recognized by the foundation are not given awards. The quality of information is not rated. Rather, the foundation has established “a set of rules” (Health on the Net, 2008d). These rules provide developers an opportunity to standardize health information on the Web, both information they share with others offline and

information they include in their multiple sites. Adherence to the HON Code is a best practice Web developers should follow and thus their attitude toward linking to evidence that their site is accurate is an important issue. The only thing as important as accurate information is giving the reader assurance that the information is accurate.

The next item (questionnaire item No. 2) regards whether it is important that these Web sites identify or link to the sources of their content. This is a common practice in academia, called one's Bibliography, Works Cited, References or Notes. It is made easy by the Web. Through hyperlinks, one can link to content that backs up, reinforces or "sources" one's content. However, many Web developers are reluctant to link to other people's documents or sites on other servers for several reasons: 1) It takes the reader off the original site. The reader may become interested in what she is reading elsewhere and not return to the original site; 2) The developer of the original site will not get credit for the page views the reader clicks through on the second site. These concerns, which may seem secondary to health care professionals who are trying to disseminate quality content, may be of utmost importance to a Web developer. Thus the question is important to ask. The conflict is deemed even more important to resolve when one considers that many of the 500 low-income sites linked off Essential Health Links — such as those in the Gateways International section — are large repositories of reference information, not places to go to learn about one particular subject written by a Web project team. Knowing the source of reference information is vital. An example of a site that links to the sources of its content is CISMef. CISMef is the French acronym for the Catalog and Index of French Language Health Resources on the Internet. This site describes itself as "a quality-controlled health gateway to catalog and index the most important and quality-controlled sources of institutional health information in French" (CISMef, 2008). One document linked off the

CISMeF site is an academic paper that introduces readers to CISMeF. The paper concludes with 30 references, seven of which include hyperlinks to sites the CISMeF team visited while preparing the paper, such as the National Library of Medicine (2008) and the Helsinki Metadata Workshop (Weibel & Hakala, 1998).

Early this century Centrale Sante, a non-profit organization consisting of engineers, physicians, librarians and lawyers (Darmoni, Leroy, Douyère & Thirion, 2000), published a paper that established parameters for assessing “the quality of health information on the Internet” (Central Sante, 2001). The diverse background of the group was designed to give it the air of objectivity (Darmoni, Leroy, Douyère & Thirion), as their goal was to generate objective criteria that would greatly ensure the quality of Web sites. One of the eight NetScoring criteria is ethics and one of the two ethics criteria is medical privacy, which is listed as an “essential” criterion (Centrale Sante).

The next item (questionnaire item No. 3) regards whether these Web sites include disclaimers, about confidentiality of data and patient rights, when appropriate. In the information age, one need not be a doctor — nor work for one — to understand the importance of the Hippocratic Oath, which reads, in part, that patient confidentiality is paramount (Global Forum for Health Research, 2008). This responsibility also is the charge of Web developers and other health informatics professionals who disseminate or otherwise publish health information, whether one is a health worker transmitting medical information via PDA from a clinic in a rural area to the capital city of Uganda, or a physician in Peru sending e-mail to a physician in Boston about a patient’s condition. In some cases, such as HIV/AIDS, a concern for patient confidentiality can lead not just to more secure communication but also to better testing

procedures. When a user sends feedback or distributes information in any manner to the Web developer of a health-oriented site, the sender has a right to expect that this information be treated with the same professionalism as if he were sending the same information to his family doctor. Privacy is further compromised by the fact that Web developers have the ability to obtain information from the user's computer — about the user's usage patterns — without the user being aware of the transaction. Many Web sites have Terms of Use pages that explain their policies and procedures. Here is part of one from, *AIDSinfo*, a site linked off Essential Health Links:

Of the information we learn about you from your visit to *AIDSinfo*, we store only the following:

the domain name from which you access the Internet (such as 'aol.com'), the date and time you access our site, the type of operating system and browser used, the Web pages accessed, terms entered into our search engine, and the Internet address of the Web site from which you direct-linked to our site (AIDSinfo, 2008).

Such information can help the Web developer determine whether his site is being viewed on “old” computers. Meanwhile, online privacy concerns are not limited to health information. Privacy was a factor when Butcher, Addo and Isaacs (2003) conducted a “baseline scan” of Schoolnet Africa, a “learner-centred educational programme which promotes learning through educational website development by multi-national, pan-African teams of learners” (SchoolNet Africa, 2007). Schoolnets are “networks of stakeholders involved in education, working via the web and face to face to bring about innovation in education” (Youthmeonline, 2008). It was the initial analysis of the status of schoolnets across Africa. The primary research questions regarded “the extent and nature of schoolnet activity in the 28 identified African countries” and “the

services that schoolnets provide to schools in their countries of operation.” One of the “common points” the researchers found in documents they examined is that “Measures should exist that safeguard the privacy of end-users in the community” (Butcher, Addo and Isaacs, 2003).

In August of 2007, in an effort to support better health care for Europe, the European Commission drafted recommendations on e-health interoperability, related to the connection of people, systems and services (International Telecommunications Union, 2007). The goal of this project was to give authorized health care professionals “access to essential health information about patients, subject to the patients’ consent, and with full regard for data privacy and security requirements” (International Telecommunications Union). Among the information that could be collected and stored electronically: a patient’s electronic health record, patient summary and emergency data “from any place in Europe: within countries, in cross-border regions, and between countries” (International Telecommunications Union). In her speech at the World of Health IT 2008 Conference & Exhibition, Viviane Reding of Luxembourg, the European Commissioner for Information Society and Media, stressed that privacy is paramount. “I must mention the data and privacy protection aspects of the issue that require our full attention and are being covered in the ongoing work,” she said. “Indeed basic patient identification and authentication are necessary in this ICT enabled area that includes cross-border situations. Security of the circulating data must be ensured, privacy must be guaranteed.”

The next item (questionnaire item No. 4) regards whether the Essential Health Links Web sites should indicate when they were last updated. In their book about the best attributes of homepage usability, Nielsen and Tahir (2002, p. 85) indicate that an area of the top of the page should indicate when a site was last updated. This gives the site’s look and feel a sense of

urgency and keeps the developer honest about how often the site is updated. Using an Excel spreadsheet listing the first 20 percent of approximately 500 numbered Essential Health Web sites dedicated to health workers in low-income countries, and a random number chart of numbers 01 through 99, (Toothaker, 1986, p. 563), this researcher randomly selected 10 sites to determine how many denote when they were last updated — on their homepages. Starting with the second number and picking every third number, the sites chosen were numbers 47, 86, 24, 16, 27, 56, 26, 56 (duplicate), 16 (duplicate), 94, 42 and 31. As Table 1 shows, checking the sites represented by these numbers on the spreadsheet, four of 10 — or 40 percent — indicated when they had last been updated.

Table 1: Sites with Contact Us Links

<u>Random Number</u>	<u>Site Name</u>	<u>Date</u>	<u>Explanation</u>
16	Indian Medlars Centre	Yes	May 27, 2008
24	Disaster Info	No	
26	Infomed Cuba	No	
27	CAPHIS	Yes	April 2001
31	A Guide to Electronic Healthcare	No	(No longer linked)
42	Global Forum for Health Research	No	
47	Aid Workers Network	No	
56	S. African Med. Research Council	Yes	May 29, 2008
86	WHO: The world health report	No	
94	S. African Med. Research Council	Yes	May 30, 2008

Indicating when a site was last updated is especially critical with health sites because the content could be useful to save a life. If it is not updated, health workers could fail to learn vital new treatments or cures. Also, if a health site has not been updated, health workers might not learn about changes in protocol that are deemed necessary after it is learned elsewhere that past practices can be harmful.

The next item (questionnaire item No. 5) regards whether it is important that these Web sites be updated on a regular basis. Users will only know that the site has fresh content if it also indicates when it was last updated. If a reader sees the last update date, and recognizes that it is updated often, he will gain confidence in the site. Thus when shoveling online health care information that is in hardcopy journals, a Web developer's job is only partially done. It is now essential that he update his site(s) regularly, which is not necessary or expected for the publishers of hardcopy journals. Most journals are published monthly or quarterly. Eight sites linked off Essential Health Links that are not dedicated to low-income countries are search engines. Given how and why they are used, it is imperative that search engines be designed for updating on a regular basis, to include the most recent information. According to lunavista.info, an online search engine marketing newsletter, not updating sites regularly is one of the five mistakes made by small business Web sites (lunavista, 2008). One way that sites can be updated regularly without changing the design dramatically is through periodic posting of news in the field of study to which the site is dedicated. The World Health Organization site is an example of a site that dedicates much of its homepage space to recent news. As of this writing (May 30, 2008) 19 of the 24 links in the center and right rails on this site are dedicated to current events, such as the earthquake in China, the World No Tobacco Day and the outbreak of avian influenza — and they

are dated to indicate freshness. Among the other five links is an annual report on global public health and key statistics.

The next item (questionnaire item No. 6) regards whether it is important that these Web sites help health workers make health care decisions. Is a Web developer's site a resource for health workers or is it something else? Health workers may need to make decisions about a single, current patient or they may be making decisions in preparation for an epidemic that is only just beginning. Whether one is preparing to care for AIDS patients in Africa — an ongoing problem — or preparing to provide health care in China after the earthquake, much of the health information available on the Essential Health Links sites is designed for such health workers. Some of it is designed for health trainers, academicians and students. Other sites are designed for health librarians. Information and communication technologies (ICT) have the potential to be used widely in care of patients. By using Essential Health Links, health workers in low-income countries have the same opportunity to access information online about illnesses — such as HIV/AIDS or malaria — that they have to access information about health care in specific regions or health care information about body parts.

HIV/AIDS is a growing threat in India, where an estimated 5.1 million people lived while infected with HIV in 2004. That accounted for some 60 percent of the South Asia AIDS epidemic at that time (International Development Research Centre, 2004). Despite having some 1,200 agencies working on the AIDS crisis, there were many problems: “Lack of capacity-building training programs using ICT that can reach a larger number of organizations that are not feasible through conventional methods,” “dearth of quality electronic forums that can facilitate networking, sharing of knowledge and best practices in a cost-effective manner among

individuals and organizations working on HIV/AIDS in India” and “[i]nadequate access to electronic resources tailored to the needs of various HIV/AIDS organizations” (International Development Research Centre). These are all challenges that the Essential Health sites oriented toward HIV/AIDS can impact in a positive manner. These sites are linked off subcategories, such as Databases and Statistics, Diagnosis and Management, Dictionaries and Glossaries, Email Lists, Gateways, Organizations and Prevention and Control (Academy for Educational Development/SATELLIFE, 2008a). Each has the potential to help health workers in low-income countries make decisions regarding their patients who are HIV positive or who have full-blown AIDS (when infections such as parasitic pneumonia and Kaposi’s sarcoma develop).

The next item (questionnaire No. 7) regards whether it is important that these Web sites contain high quality health care content. The Internet Health Coalition once published “Guidelines for disclosure, patient privacy and quality content” (2006). However, that organization’s site is no longer on the World Wide Web. The American Medical Association (2008) states its guidelines for medical and health information sites on the Internet on its Web site. According to AMA guidelines, AMA Web site content “should” be checked for quality before it is posted. In mentioning quality, AMA is referring to originality, accuracy, and reliability. Only content experts not involved in the creation of a site should review that site, to avoid conflict of interest. After the review, the site should be altered to account for changes necessitated by the review (Winker et al., 2000).

Medical informatics is a field involving information systems that support health care through distribution of health care content. In Africa, the medical information systems and telehealth applications include: “medical language, coding, standards and classification, medical

imaging, simulation, communication systems and protocols for health care, intelligent clinical decision support systems [and] use of expert systems” (Lishan, 2003). Writing for the United Nations Economic Commission for Africa (UNECA), Lishan states that:

[e]xpertise in the area of medical informatics is nonexistent in Africa. Although the branch of medical informatics is still evolving it is essential to improve awareness in the area. For Africans to participate in this growing field, it is essential to establish a center of medical informatics in the region to bring doctors close to the opportunities provided by ICTs rather than judging claims of experts on the issues that affect the health sector. International and local support in establishing medical informatics centers are crucial (Lishan, 2003).

Improving medical informatics systems should improve the quality of health care in Africa. Meanwhile, high-quality health writing begins with and depends upon gathering and evaluating medical information. Gastel (2005) suggests: evaluating the source; being consistent; evaluating your source’s (and your) study design; interpreting numbers correctly; interpreting others’ findings (and yours) correctly; accurate applicability of your findings; consideration of alternatives; and confirming the uniqueness of findings. Writing about quality content in technical communication, Hoft (1995) suggests a strategy that may be helpful to Web developers in health care. According to Hoft, a minimum requirement that one should strive for must include technical accuracy. One could update Hoft’s words about high technology to apply them to health care: “Information that describes high technology [such as health care online] must contain technically accurate information. The integrity of the information depends on it” (Hoft, 1995, p. 295). One of the key reasons why inaccuracies are so intolerable in international

technical communication is that inaccuracies are repeated every time the bad information is translated into another language. To avoid such problems, Hoft suggests that, to the degree possible, any information product should be subject to testers. Health care information should face the same scrutiny.

The next item (questionnaire item No. 8) regards whether it is important for Web sites to maintain “a tone best described as objective.” Some of the sites linked off the Essential Health Links gateway may have been designed by or for commercial businesses that sell products. This fact may be obvious to the user or it may be disguised. In the latter case, it is important that the user know that content on the site is not likely to be objective, so he can make intelligent decisions about his health or that of a patient. This is primarily a concern regarding Web sites dedicated to pharmaceuticals. Are the drugs mentioned on a site being touted by objective medical professionals or by people who work for — or on behalf of — the pharmaceutical industry? The point is not to discourage pharmaceutical companies from assisting in the development of Web sites that are designed for viewing by health workers in low-income countries. Convincing pharmaceutical companies to sell their drugs in low-income countries is so difficult that one researcher proposed a reward system, “with the reward to be based on the incremental health effects of the innovation in developing countries” (Hollis, 2005). The point is to ensure the objectivity of the sites. The ultimate act of objectivity may be when an organization admits the information on its site may not be valid. Sometimes, Web sites built by non-profit organizations publish disclaimers holding the organization harmless from the content on its own site, as with the Roll Back Malaria disclaimer: “Roll Back Malaria does not warrant that the information contained in the web site is complete and correct and shall not be liable whatsoever

for any damages incurred as a result of its use” (Roll Back Malaria Partnership, 2007). This is likely done for legal purposes but it is also a form of objectivity. Gastel recommends readers that medical writers check their work for accuracy. “Make sure that you have accurately portrayed the big picture” (Gastel, 2005, p. 112). With the Essential Health Links sites, the big picture could be about the use of hypertonic or isotonic intravenous fluids for resuscitation (Busato, 2008) or about whether antibiotics are warranted in the treatment of a patient (Alliance for the Prudent Use of Antibiotics, 2008). In either case, the objectivity of the Web developer is of paramount importance.

Audience

The next eight items regard the Web developers’ attitudes toward their audience. The first item of this section of the survey (questionnaire item No. 9) asks whether it is important that Web sites include a mechanism for providing feedback, such as a Contact Us page with an e-mail link back to the site manager. In November of 2002 the Poynter Institute, a school that provides continuing education for journalists, redesigned its Web site (poynter.org). When scores of users noticed that the items in the top of the left rail were moved to the bottom of the page, they expressed their displeasure through online feedback. Here is one example from a site user:

I’ve enjoyed reading this site for a long time, but have been moved to register only now, so I could make a posting about the design change. I’m sure this was well intentioned, and I know it took a lot of work to implement. But it simply is less usable, readable, and comprehensible than before. Please bring back as many of the old simple-to-use elements as you can (Fallows, 2002).

Feedback is a critical aspect of any professional Web site. In this case, the Poynter Institute heeded its feedback and restored the content in the left rail. Here is Poynter’s response:

One way or another, the left rail items will return to the top of the page. We'll be working on that this week, along with the other suggestions. The feedback system clearly needs some fixes, and there are a bunch of things that we'll sort into what we can do now or later (Mitchell, 2002).

Even though something was wrong technologically with the feedback system, it worked well enough to get the message across to developers to restore the old left rail. How important is feedback? In one project Nielsen was attempting to determine “how to get feedback from users to determine usability and future design directions for a large Web archive of historical documents” (1999, January). He received numerous suggestions: survey forms; single-question surveys; give users specific choices; create a user group (blog) for “friends of the site;” and institute user registration or profiles. Meanwhile, Nielsen and Tahir (2002) state that the feedback link on a Web site should state its purpose (Contact Us; Give us Feedback; Take a Survey) and it should state who reads the feedback (p. 13).

Littlejohn and Foss (2005) discuss feedback in terms of cybernetics, “the tradition of complex systems in which many interacting elements influence one another” (p. 40). If designed correctly, the feedback mechanism on a Web site will give users a way to influence the Web developer. Finally, Hoft offers input on providing feedback for pre-Web communicators that can be extrapolated for use by developers building sites to be viewed in target countries. Here is her advice, adapted for the Web: 1) Make it easy for users to respond to the Web developer. 2) Make sure there is no language barrier; 3) “Test the feedback method in the target country before you use it;” 4) Get ideas for how to request feedback from other companies that have Web sites dedicated to the target country (Hoft, 1995, p. 306).

The next item (questionnaire item No. 10) regards whether information on Web sites should be written in such a way that the target audience completely understands it. An unfortunate reality in business is that both the corporation and the customer have needs that may be inconsistent. This philosophy carries over to the relationship between the Web developer and her audience. The user of a Web site who lives in a low-income country likely has a lower level of education than the Web developer and the audience in a developed country. According to Hoft (1995), the developer must consider six factors related to how the audience member perceives the content. Four concern content: language, learning style, communication style and visual literacy. The other two are technical literacy and computer literacy. The first four are essential considerations when generating content for a Web site. On the Disasters Web site, the Pan American Health Organization offers an “International Course for Managers on Health, Disasters and Development” (Poncelet, 2008). Similar information is available on this site in Spanish and Portuguese. Learning style also is important. Learning styles differ from country to country, continent to continent. In some cultures, it may be difficult enough just to get certain groups to use computers. As Rathgeber and Adera demonstrate, the task of matching their learning style is a secondary but vital concern.

[W]omen may deliberately avoid the use of ICTs [information and communication technologies] because the accepted structure of interaction with the technologies goes against their preferred way of dealing with problems and people. If that is the case, then there may be an argument for reconceptualizing the ways we use ICTs or, at the very least, for ensuring that knowledge transferred through ICTs is packaged to conform to female users' preferred learning styles (Rathgeber & Adera, 2000).

Communication style involves the manner in which one sends and receives messages. In intercultural situations, bridging communication style barriers is difficult. In intercultural health care situations, bridging these barriers is essential. Luckmann (2000) list 10 strategies for "Using Transcultural Communication to Work with Team Members." They can be adapted for use in the relationship between Web developers and health workers (pp. 269-270). Among them, adapted for the Web developer to read, are: Recognize that the health worker probably has an educational background "very different from your own" (p. 270). Acknowledge that the health worker's value system and perception of what constitutes a good Web site may differ from your own (p. 270). Through feedback or some other method, try to assess the health worker's understanding of verbal and written communication in the language and education level it is presented (p. 270). Finally, Karabeg (n.d.) defines visual literacy as "the ability to decode and design implicit information." Decoding and designing information across cultures is especially problematic. According to Berger (p. 179), a photograph "is a result of the photographer's decision that it is worth recording that this particular event or this particular object has been seen" (Watney, 1986, in Evans and Hall, 1999, p. 147). It also is true that a Web site is the result of the site's developer

determining that “it is worth recording” an image on his site. What may be missing from the developer’s decision is how much consideration he gives the visual literacy of the viewer.

The next item (questionnaire item No. 11) regards whether it is important that the developers of these Web sites carefully consider feedback from users in decisions about the site’s textual content. This item is similar to item 9 but whereas item No. 9 regards the Web developer’s attitude toward the feedback mechanism, No. 11 regards the developer’s attitude toward the actual feedback comments. Along with the vast breadth and depth of content on the Internet, the potential immediacy of e-mail feedback is a central feature. One of the purposes of feedback is for users to tell Web developers what they like and do not like, what works and does not work. One of the most important times for having feedback — during the life of a Web site — is when a site is new or has been redesigned. It is at those moments when the Web developer is most conscious of problems with the site because at those times the site is most apt to include errors and bad links. Using the same method as above, this researcher sought to find out how many of 10 randomly selected Web sites linked off Essential Health Links have feedback mechanisms on their homepages. Starting with the fourth number and picking every second number, the sites chosen were numbers 73, 97, 24, 62, 76, 27, 12, 85, 26 and 55 (Toothaker, 1986, p. 563).

As Table 2 shows, checking the sites represented by these numbers on the spreadsheet, nine of 10 or 90 percent have online feedback mechanisms on their respective homepages and the 10th URL is a dead link.

Table 2: Sites with Feedback Links

<u>Random Number</u>	<u>Site Name</u>	<u>Feedback</u>
12	WHO: Regional Office for Africa	Yes
24	Disasters info	Yes
26	Infomed	Yes
27	Consumer and Patient Health Information Section	Yes
55	Abstracts of Cochrane reviews	Yes
62	Health InterNetwork Access to Research Initiative	Yes
73	Healthlink Worldwide	Yes
76	WHO: Health Topics	Yes
85	WHO: Disease Outbreak	Yes
97	Partners for Health Reformplus (PHRplus)	Dead link

The next item (questionnaire item No. 12) regards whether it is important that target audiences of Web sites be clearly defined. It is vital in Web development to know one's audience. Hoft (1995) recommends that, in researching international variables affecting a target audience — political, economic, social, religious, educational, linguistic — one should list the similarities and differences between the source country and the target country on these variables. Over time, this information will change, so a record of the changes should be kept (Pp. 60-61). “As you create more worksheets, one for each target country, you can review the differences and similarities of many countries. Take these worksheets and tape them to a wall to create a storyboard” (Hoft, 1995, p. 61).

The next item (questionnaire item No. 13) regards whom these health-oriented Web sites

should be designed to be useful to. The answers to this multiple choice — non-Likert Scale — item include six named choices, plus Not sure and Other. Respondents may choose more than one. The six named choices are workers at primary care health centers (clinics); workers at regional hospitals; workers at tertiary care or referral hospitals; workers at ministries of health; workers at international health organizations; and consumers/patients. According to the World Health Organization, there are 59.2 million health workers worldwide. Health workers are “all people primarily engaged in actions whose primary intent is to enhance health” (World Health Organization, 2006a). This definition could include mothers, since they often look after their sick children, although they are rarely paid to do so. The number of health workers worldwide is not keeping up with the need. According to the same WHO report, some 4.3 million more are needed. Workers at rural clinics see patients who are the most difficult to reach, such as those Farmer cares for in the most difficult regions to reach in Haiti (Kidder, 2003).

One way to understand the challenge of health workers is to study the details of health centers in one region of Africa, the Kabale district (a district is similar to a state) of Uganda. There are 58 health centers in 16 sub-counties of the district, plus a regional hospital and six health centers in three “divisions” of Kabale township, the district capital. These centers are graded by the services provided. The HC II centers provide fewer services than the hospital, which is the sole HC V. There also are a number of HC IIIs and HC IVs in Kabale which offer more services than the HC IIs and fewer than the hospital. They are owned either by the government or by non-governmental organizations. Drilling deeper, there are four health centers in the Bukinda sub-county of Kabale. The Bukinda health center (HC III) is government owned while the Kakatunda, Muhanga and Kihanga health centers (all HC II) are all owned by NGO. Kabale Regional Hospital, located in Kabale, is an HC V (Kabale health services directorate,

n.d.). The Kakatunda clinic is owned and operated by the Roman Catholic Church. Meanwhile, the central government's Uganda Ministry of Health employs 27 officers, from the minister of health and two ministers of state for health (the top three positions) down to the program managers for control of AIDS, malaria, tuberculosis/leprosy, Guinea worm and onchocerciasis (Uganda Ministry of Health, 2008).

Typically, international health organizations are divided into three groups: multilateral organizations, bilateral organizations, and non-governmental organizations (NGO). Funding for multilateral organizations comes from a number of governments (in addition to NGO). This aid is distributed to many different countries (International Medical Volunteers Association, 2008). Finally, consumers/patients are increasingly getting access to health care information on the World Wide Web at Internet cafes and telecentres across low-income countries.

The next item (questionnaire item No. 14) regards what professions the health workers who should view these Web sites are primarily from. There are 13 non-Likert Scale options. Each profession plays an important but different role in low-income countries, but each has a different perspective. For example, in studying malaria, one should consider: A medical anthropologist studies malaria from an "ecological" point of view (Dupont, 1998); an epidemiologist refers to malaria as "a silent tsunami" (de Savigny, 2005); health communicators make PowerPoint presentations about the "Intolerable Burden of Malaria" (Nafu-Traore, 2005); the Carter Center produces and distributes health learning material modules about specific topics (Carter Center, 2008) in Ethiopia, where some 53 million (or 63 percent) of Ethiopians live in areas at risk for malaria (World Bank, 2008). Health trainers are vital for training health workers in low-income countries. But there are not enough. Experts estimate it will cost \$2.64 billion to train the extra 1.5 million health workers that are needed in Africa alone (World Health

Organization, 2008b). There are more than 70 sites linked off Essential Health Links dedicated to tropical diseases, including 11 specifically dedicated to malaria. Web developers may wish to have their content viewed by others in their profession — such as other online journal publishers — so that they can begin to link to one another.

Librarians are finding their jobs to be more difficult now than in the past. Not unlike businesses, libraries and the information specialists who work in them “must assume a more proactive role to cope with increasing competition” (Jain, Jambhekar, Rao, & Sreenivas, 1999). One way they can reduce expenses is to encourage their patrons to use the free sites linked off Essential Health Links while surfing computers in their facilities. Medical doctors, nurses and midwives, who have the most direct contact with patients, would benefit the most — of those in the professions listed in this questionnaire item — from these health-related Web sites. Meanwhile, policy makers, researchers and technologists all have very specific reasons for viewing Essential Health Links sites.

The next item (questionnaire item No. 15) regards whether it is important that these Web sites carefully consider feedback from users on decisions about the site’s graphical content. Assuming there is a mechanism for feedback, a Web developer can use it to judge the textual content on her site. But should she also heed feedback about the graphical content? The Web is a visual medium. How one designs a page is a statement by the Web developer about how she feels about the Web design process. How a site is graphically designed potentially creates — or is potentially the result of — one or more of the following barriers to Transcultural communication: 1) the source and target user’s perceived lack of knowledge about one another; 2) fear and distrust by the user; 3) racism; 4) bias and ethnocentrism; 5) stereotyping; 6) ritualistic behavior; 7) language barriers — because not all language is verbal; and 8) differences

in perceptions and expectations (Luckmann, 2000, p. 60). If a site has many colors or many images, the message may be different than if a site has few colors, few images and lots of white space. But whereas much of published content is not a subjective choice (2 + 2 will always equal 4 and the old ways to treat diseases still exist), graphics on a Web site are a subjective choice. If a Web developer heeds feedback about his graphical content, he is allowing the user to give input about the cultural significance of the images he has chosen to use and he is allowing the user to give input about the technological impact of those images on the user's ability to load the site or a page. Studying health communication in developing countries, Johnson (1991) discovered that in Botswana in 1984, the government installed traffic signals without previously training the public that red means stop and green means go. The citizenry's "visual literacy" was different from that of people in the Western world (Hoft, 1995, p. 265). To reach the largest audience, Gastel recommends that developers "strive for simple graphics that present key elements without clutter that can distract" regardless of whether he is designing the graphics by himself, working with others who are designing the graphics or choosing from an existing assortment of graphics (Gastel, 2005, p. 106). Once the appropriate graphic is chosen, it is important to place it in the proper spot on a page, such as close to the text to which it refers (Nielsen and Tahir, 2002, p. 201). After the graphic is placed, the developer should heed feedback about it.

The next item (questionnaire item No. 16) regards whether it is important that these Web sites be usable by people for whom English is a second language. When one encounters someone — in person — speaking a different language than he does, it is difficult for either person to turn and walk away, without feeling he is being rude. On the Web, when one encounters a Web site in

another language, it is easy to click off the site. Therefore a Web developer must choose languages for his site that match the languages of his audience. Through research, he will be able to determine which languages are appropriate for the site. Localization is the “process of creating or adapting an information product for use in a very specific target country or specific target market” (Hoft, 1995, p. 11). On the Web, localization typically consists of a developer creating a site in a major language — usually English, Spanish or French — and then linking to other versions of that site written in other languages, from country flag image maps at the top of the original homepage. Each flag represents the language of the secondary site. “Free Medical Journals” is a site linked off inasp.info that offers links to medical journals indexed by specialty, title, newness and language (English, French, Spanish, German, Portuguese, Turkish and Other — Catalan, Italian and Russian) (Free Medical Journals, 2008). In person, people who do not speak the same language can opt to communicate through “trade languages” which are pidgin forms of original languages (Hofstede and Hofstede, 2005, p. 327). English is a very difficult language to learn, but many people across the world have learned English to some degree and it has become the language most used in commerce in the modern world. English also likely is the language most used in health care in the western world. Swahili also is considered a pidgin language. But “[c]ommunication in trade languages, or pidgin languages, limits those exchanges to those languages for which these simplified languages have words” (p. 328). When developers of a site choose not to localize it or not to translate it into another language, they sometimes link to pages with letters written in a secondary language telling users how to get further information. Nielsen and Tahir (2002) applaud this approach. Whether this approach would succeed in 2008 is debatable (Nielsen and Tahir, 2002, p. 269).

Technology (Distribution Method)

The next four items regard the Web developers' attitudes toward their audience's technology and technological constraints. The next item (questionnaire item No. 17) regards whether it is important that these Web sites require registration. From this researcher's time spent exploring the many Essential Health Links sites, it appears few require registration. In the early days of radio, listeners would send post cards to radio stations they heard to let the stations know they were listening. Decades later, after the World Wide Web remediated television and radio, Web users perform the same function by registering to use a site. Web developers can receive a wealth of demographic information about their users by requiring free registration. When requiring registration, it is not uncommon to do so only after each user has accumulated several hundred "pre-registration" page views.

The next item (questionnaire item No. 18) regards whether it is important that these Web sites be accessible with a dialup modem. If one makes an attempt to disseminate health information digitally, he must ensure that the recipients have adequate technology to receive the information and transmit feedback. A Web developer could either decide to target the largest possible audience and create a low-bandwidth site or he could decide to target a more specific niche audience and create a higher-bandwidth site, if the niche audience has better technology. For anyone using the World Wide Web on a late-model computer in a developed country in 2009, this would seem like a difficult problem to fathom. After all, new computers with plug-in software can show almost any kind of Web site, even sites with video. But even workers in developed countries experience difficulty viewing many sites. Consider using Macintosh computers with the OS9 operating system in 2009. Many Web sites have been "optimized" for

OS10. If users in developed countries are having difficulty viewing these typical Web sites, it is logical to assume that people in low-income countries are experiencing similar problems, if not worse. Recognizing that 59 percent of African universities do not manage their bandwidth “in any way,” according to the 2004 African Tertiary Institutions Connectivity Survey in Belcher (2007), researchers began an IDRC-supported program called “Supporting training for the optimisation of university bandwidth in Africa.” One of the key projects was training on “ ‘bandwidth optimisation and management’ ” (Belcher).

The next item (questionnaire item No. 19) regards whether it is important that these Web sites load quickly, even if it means limiting graphics. In some areas of Africa, Internet speed can be 50 times slower than in a European country such as Norway. However, some Africans pay twice what Norwegians pay for access (Hansohm and Erwin Naimhwaka, 2007). According to Jensen (2006), bandwidth to the Internet is like blood to the body. However, bandwidth is least available where it is needed most, in low-income countries. He cites several reasons: The only way to supply “sufficient” low-cost, international bandwidth is through fiber-optic cable. The world’s fiber backbones have not yet been attached to African computer networks. The little fiber that has been laid in Africa is not competitively priced. The typical business model is monopolistic. Some entrepreneurs were planning to run a cable through East Africa (called EASSy). However, this effort was deemed a “club” likely to promote high prices and low volume. An effort was undertaken to open EASSy to public use. If that plan works, other regions of Africa could follow and provide open access to fiber (Jensen, 2006).

The next item (questionnaire item No. 20) regards whether it is important that these Web sites be usable for both novice and advanced Internet users. One of the most intriguing user

groups for information and communication technologies (ICT) is women in Africa. Many women play highly subservient roles to men in domestic situations in developing countries. This can result in their lack of — or diminished — access to ICTs. Munyua believes women have an institutional disadvantage regarding learning about computers.

One of the more pervasive but intractable problems is “technophobia,” the fear of technology. Women often have complex relationships with technology and machines as a result of being socialised over time to believe that machines and technology are a man’s domain and not for women and girls, thus generating a gender bias in attitudes towards studying or using information technology. The social factors that produce these gender differences operate in both institutional and informal settings. In some societies, cultural norms discourage interaction between women and men outside the family, and women may be uncomfortable in situations where men are present either as trainers or as peers (Munyua, 2005).

With the aforementioned shortage of health workers in low-income countries, more female health workers are needed. The World Health Organization (2006a) places women health workers in three classifications: doctors, nurses and others. The ratio of women nurses to women doctors is greater in Southeast Asia and the Western Pacific than it is in Africa and the Eastern Mediterranean. One way to ensure more females excel in health care in Africa is to help them to overcome this “man’s domain” stereotype about technology.

Demographics

The next three questionnaire items are about the respondents and their sites. The first (questionnaire item No. 21) states: My Web site linked off Essential Health is dedicated to: a) A disease or syndrome (such as malaria); b) A geographic region (such as sub-Saharan Africa); c) A body part such as the eyes or reproductive system; d) A combination; e) Other. The next item also is about demographics. It states: The person who completed this survey is: a) A health care professional with Web design experience; b) A health care professional with no Web design experience; c) A Web developer with a medical background; d) A Web developer with no medical background; e) Other. The final item also is about demographics: The managers of this Web site are based in what country? The first two items ask for classifications. The final item asks for a fact.

Part III: The Plan

Overview

This survey research is a multi-step process. The first step was to create an Excel spreadsheet with information about Web sites linked off INASP Health Links that were devoted to health workers in developing countries (Appendix E). The next step, some time later, after conducting a months-long review of the literature, was to create a new Excel spreadsheet with information about Web sites linked off Essential Health Links that were devoted to health workers in developing countries. (This was necessitated by the move of the links from the INASP Web server to the AED/SATELLIFE Web server.). The next step was to write a 125-item questionnaire (Appendix A), based on the literature review. The fourth step was to cull the questionnaire to 23 items (Appendix B), based on a conversation with Rhine. The University of

Central Florida's Institutional Review Board then approved this research (Appendix I). This step is a requirement for all research at UCF involving human subjects. The questionnaire will now be created online — using Survey Monkey — and a link to the survey will be distributed to Web developers via e-mail.

More Details about the Plan

Using Survey Monkey enables customers to create multiple-choice questionnaires with radio buttons for respondents to click on to indicate their answers. The product also allows customers to create an online address book of potential respondents, by typing their contacts' e-mail addresses and the names of their organizations or merging them from two columns on a spreadsheet (Appendix E or Appendix F). It also allows customers to write personalized form letters to each potential survey respondent [Dear <Web site name> contact:] (Appendix C and Appendix D). The product tabulates percentages for each possible response to each item. Finally, Survey Monkey enables customers to export the data to Excel, from which it can be exported to SPSS and statistical tests can be conducted.

Two documents created for this research (Appendix E and Appendix F) are spreadsheets that include the names of the hundreds of INASP Health Links and Essential Health Links Web sites, respectively, in addition to the categories they are in, the URLs of the sites, contact e-mail addresses and the names of contacts. As this is an anonymous survey, none of this information is to be shared with anyone other than members of this researcher's committee, if requested. The names of the Web sites are to be used during the phase when questionnaires are distributed, using Survey Monkey. The INASP and Essential Health Links categories on the spreadsheets are useful in searches for Web sites related to specific topics, such as searches for all the Health

Links sites about malaria or tuberculosis. The URLs are useful in conducting research about the sites, such as whether they have Contact Us pages or list Last Updated dates. E-mail addresses are useful for contacting Web developers. The people listed in the spreadsheets are names of contacts who seem most appropriate to send the initial e-mail, be they Web site contacts, executive directors, Webmasters, etc. In each case, the e-mail recipient will be asked to forward the e-mail to “the person at your organization who is primarily responsible for managing the site,” who, for the purposes of this research is considered the Web site’s developer. It is important to distinguish between who is an appropriate respondent and who is not. To send the initial e-mail to an executive with overarching responsibilities — who is not familiar with the Web site — would not be appropriate. Likewise, to send the initial e-mail to a low-level Web editor or graphic artist would also be inappropriate. Through the initial e-mail, an effort will be made to ensure that the respondent is a high-ranking person in the organization who is familiar with the Web site, perhaps one who manages the people who program and maintain the site.

When creating the initial spreadsheet it was found that, in many cases, the same contact name or e-mail address is listed for multiple sites. An example of this is the multiple World Health Organization sites that list the same e-mail contact (mediainquiries@who.int). In a number of cases, the e-mail link is listed without a person’s name. This is a reliability consideration. It is impossible to determine who receives e-mails sent to blind addresses and impossible to control to whom the recipients forward the requests. Information from Appendix E, the INASP spreadsheet, listing sites formerly linked off inasp.info, served as the template for Appendix F, the updated Essential Health spreadsheet, listing sites linked off the AED/SATELLIFE site (healthnet.org). The new spreadsheet was created after the sites were

moved from INASP’s server to the Essential Health server, and after much time elapsed while an extensive review of literature was conducted. Some categories from INASP that no longer existed on the Essential Health gateway were deleted from the list. New categories were added. Some sites that no longer had active URLs were deleted. One major alteration was the change from “developing countries” to “low-income countries.” Otherwise the INASP information and the Essential Health Links information are similar and the two spreadsheets are similar as well. In addition to adding and removing sites to create the second spreadsheet (Appendix F), it also was important to learn the names of new contacts and contacts at the newly included sites — and their e-mail addresses — so they would not be left out of the survey.

The 125 items in the first questionnaire (Appendix A) were derived from an extensive literature review about health information, health writing, technical communication, international technical communication, intercultural communication, cross-cultural user-interface design, human-computer interface and public health informatics. These items dealt with content, audience and usability issues. After consulting with Rhine, this researcher culled the list to 23 items (8 related to content, 8 related to cultural sensitivity, 4 related to technology and 3 related to demographics) (Appendix B).

The University of Central Florida’s Institutional Review Board “reviews all human subjects research that is conducted by students and faculty at the university and in the local community” (University of Central Florida, 2008). Per UCF guidelines, this researcher completed a proposal/application that was vetted and approved by IRB staff (Appendix I), using the Web-based Integrated Research Information System (iRIS™). The application included answers to a number of questions, including: The title of the project; the UCF department,

professor and student involved in it; whether the research would involve human or animal subjects (it involves human subjects); a description of the project; funding information; research study elements (The present study involves survey research and international research); whether human embryonic stem cells or germ cells are part of the present study (they are not); whether the research involves use of HIPAA-protected health information (it does not); how survey respondents would be recruited (through the Web and e-mail); the demographics of the target audience (Web developers); whether participants will be compensated (no); whether the survey will be anonymous (yes); what security measures will be taken to keep individual respondent data from being distributed; the risks and benefits associated with this study; and whether/how respondents should give informed consent before they participate. This application was updated several times as information changed.

This researcher and his dissertation director, Craig Saper, both took and passed “CITI training.” The University of Miami and the Fred Hutchinson Cancer Research Center worked together to establish the Collaborative Institutional Training Initiative (CITI) in March 2000. Their goal was to develop a Web-based training program in human research subject protections (CITI program: Collaborative Institutional Training Initiative, 2008). The modules completed during CITI training included: HIPAA and Human Subjects Research; Conflicts of Interest in Research Involving Human Subjects; History and Ethical Principles; Defining Research with Human Subjects; The Regulations and The Social and Behavioral Sciences; Assessing Risk in Social and Behavioral Sciences; Informed Consent; Privacy and Confidentiality; Research with Prisoners; Research with Children; Research in Public Elementary and Secondary Schools; International Research; and Internet Research (CITI program: Collaborative Institutional Training Initiative [password protected area], 2008).

It was important to find an appropriate method for disseminating the survey. Earlier in this process Pakenham-Walsh suggested sending surveys to respondents in the body of an e-mail message and asking them to respond to the surveys in an e-mail reply (Personal communication with Ed Scott, 2004). However, that method did not seem secure, considering survey results collected in this manner could be forwarded to people not involved in the research. Anyone who sees one of those messages would be able to instantly connect a set of responses to the e-mail address on the same message. A representative of UCF IRB recommended surveymonkey.com, an online survey creation tool. Survey Monkey, which is free for minimal use, allows researchers to create surveys and to e-mail links to the surveys to potential respondents. It then generates reports with the following results: response count, rating average (mean), and the raw numbers and percentages for how respondents answered on each item (Survey Monkey, 2008b). For example: In a survey in which a Likert Scale is used, 50 people respond to a statement that global warming is happening to Earth. Fifteen respond Strongly Agree, five respond Agree, 10 respond No Opinion, seven respond Disagree and 13 respond Strongly Disagree. The response count is 50, the response average is 3.04, the percentages counts are 30 percent strongly agree, 10 percent agree, 20 percent have no opinion, 14 percent disagree and 26 percent strongly disagree. Survey Monkey does not do statistical tests such as ANOVA and chi-square tests, but it does export the data into a spreadsheet and allow paying users to “either perform your own analysis in Excel or take the data into other statistical programs like SPSS” (Survey Monkey, 2008a).

The next step is to conduct the survey. Then this researcher will resend the questionnaire link to prior recipients who do not participate in the first round of the survey, plus a first time to Web site contacts who use forms to receive e-mail. A data analysis (of percentages generated)

will be conducted using Survey Monkey and a statistical analysis will be conducted using SPSS Grad Pack. The statistical tests will help determine if there is a difference between Web developers' attitudes toward quality content, cultural sensitivity and appreciation of the target's technological limitations.

CHAPTER FOUR: DATA ANALYSIS

*“Whose definition of ‘accurate’ would you like?”
— Survey respondent*

Part I: The Population

In this chapter I will discuss the population for the survey herein and results of the survey. I will readdress the core principle of this research before presenting data generated by calculating means for individual items on the questionnaire and data generated by calculating group means for content, cultural sensitivity and technology. Then I will address the statistical test performed on these means to determine if there is any statistical difference between Web developers on these three criteria. I will then discuss whether the raw survey results indicate that Web developers agree with a number of best practices. The final section addresses survey results about the respondents’ occupations.

Approximately 700 sites are linked off Essential Health Links. Some 500 are dedicated to health workers in low-income countries. These are the sites that were targeted for this research. The same Web developers built many of these 500 sites. This is indicated by the fact that the same contact information is listed for numerous World Health Organization sites, for example. This means there were many fewer potential survey respondents than the number of sites linked off Essential Health Links. This researcher identified 295 separate and distinct contacts representing sites in which the principal contact could be reached via e-mail and 22 that could only be reached via the researcher filling out a form on those respective Web sites. The list includes 10 links to PDFs, which — not being Web sites — are not eligible for the survey. It also includes five bad links, which Rhine/Pakenham-Walsh will likely find and fix.

The Response

Subset of a Population

A sample is a group of people who are selected to represent a population (Patten, 2002, p. 9). A population is everyone in a group. A census is a study of an entire population. What then is a survey in which the researcher attempts to survey an entire population but receives a response of less than 100 percent? This researcher attempted to contact all Web developers who have sites (500) linked off the Essential Health Links site that are devoted to health workers in low-income countries. Response was small (n=35). Respondents and non-respondents both are considered members of separate subsets of this population. Respondents are not a random sample of the population, but their survey results could be treated as such. An example of this practice is a survey of newspaper sports editors by Reinardy (2007). He e-mailed questionnaires to a population of 618 sports editors listed in the Associated Press Sports Editors 2005 Directory, not to a sample therein. A subset of that population, 184 sports editors, returned usable questionnaires.

As mentioned above, this research included surveying a population, due to the belief that a survey in which an entire population is able to participate is more reliable than a survey of any type of sample of a population. A survey of the population was done also because that is what Rhine asked this researcher to do. Later it was determined that, while raw survey results benefit Rhine and Pakenham-Walsh in the present study, surveying a sample of the population would be a better option, for future research, in terms of generating statistics from which one can make assumptions. The rationale for sampling is to “select a set of elements from a population in such a way that descriptions of those elements (statistics) accurately portray the parameters of the total

population from which the elements are selected” (Babbie, 1992, p. 200). Surveying a sample also eliminates the possibility that the researcher will select elements “on an intuitive basis” in such a way that will “support his or her research expectations or hypotheses” (p. 200).

After three mailings using contacts’ e-mail addresses and Survey Monkey, plus one mailing to each of the sites that use forms to allow contact from users, there were 35 respondents, for a response rate of 11.04 percent of the population (35/317). The same number of respondents completed the survey (n=35) as started it. Respondents added comments to all of the items. After the first questionnaire mailing, it became clear that a number of the contacts listed on the sites included bad information. Specifically, while six e-mailed responses were personal replies (“Thank you for the survey. I’ll do it tomorrow.”), the rest were automated responses, such as “We’ll get back to you” (three), “This address is disabled” (34), “I am out” (four), “The person you are attempting to contact died” (one) and “He is no longer employed by this site” (one). Poor contact information was the first finding of this research. Contact information on Web sites should be updated regularly, even when the primary contact is going on vacation and will not be accessible. Not keeping the contact information current is akin to having a phone number out of service while a business is still operational.

Part II: The Results

After the final mailing to Web developers, a data analysis was conducted to determine the mean scores of each possible answer to each item. Next a statistical test was conducted to determine if there is a statistical difference between the variables in the study, i.e. is there a significant difference in how Web developers feel about quality content, cultural sensitivity and technology. Keeping contact information accurate on a site could mean updating it frequently.

Updating frequently is one of the perceived best practices that were tested in this research. By asking Web developers to complete the survey herein, this researcher tested the popularity of 18 perceived best practices for Web developers who build sites to be viewed by health workers in low-income countries. Below are results for each questionnaire item and an explanation of how respondents viewed each of the perceived best practices.

The first eight items deal with Web site content.

Table 3: Verification of Accurate Content

1. It is important that the Web sites linked off Essential Health Links — such as mine — include a link to some sort of verification that the site contains accurate content.

<u>Response</u>	<u>Percent</u>	<u>Response Count</u>
Strongly Agree	29.4%	10
Agree	44.1%	15
No Opinion	20.6%	7
Disagree	2.9%	1
Strongly Disagree	2.9%	1
Mean		2.058823529
Answered question		34
<u>Skipped question</u>		<u>1</u>
Comments		9

1. Few sites contain such a link. HON is one method. Assessment of likely accuracy of content is complex and involves several factors that should be taken into consideration when selecting sites.

2. HINARI doesn't need verification.
3. Documentation re: how materials created may be as important as "verification" which to me implies some sort of external vetting.
4. The process to get certified would be difficult for a non-profit. Especially mine- I do this in my free time...and that's non-existent.
5. I agree theoretically, but I don't really understand what that link would be practically. Are you talking about HON or something like that?
6. Verification of Accuracy - to the best of the owner/owning organization's ability
7. For us, the names and organisations behind the content should simply be clearly stated.
8. It's not always possible. Or, if we are the source of our own information, and possibly a sole or rare source of it, who is going to verify it? Furthermore, whose definition of "accurate" would you like? We deal with some controversial topics, and although we believe that we present the issues accurately, I assure you that many people feel differently.
9. Our link with the London School of Hygiene & Tropical Medicine provides assurance of the quality of our content. I'm not sure if this is covered by your question.

Table 4: Link to Sources of Content

2. It is important that these Web sites identify or link to the sources of their content.

<u>Response</u>	<u>Percent</u>	<u>Response Count</u>
Strongly Agree	48.6%	17
Agree	48.6%	17
No Opinion	2.9%	1
Disagree	0.0%	0
Strongly Disagree	0.0%	0
Mean		1.542857143
Answered question		35
<u>Skipped question</u>		<u>0</u>
Comments		1

1. I dont quite understand this question. Which are “these Web sites”? The linked ones or the sorte of verification?

Table 5: Include Disclaimers about Confidentiality

3. It is important that these Web sites include disclaimers, about confidentiality of data and patient rights, when appropriate.

<u>Response</u>	<u>Percent</u>	<u>Response Count</u>
Strongly Agree	37.1%	13
Agree	48.6%	17
No Opinion	14.3%	5
Disagree	0.0%	0
Strongly Disagree	0.0%	0
Mean		1.771428571
Answered question		35
<u>Skipped question</u>		<u>0</u>
Comments		5

1. “disclaimers” are usually not about confidentiality or patient rights; they are usually about the clinical consequences of people using the information

2. HINARI doesnt need disclaimers.

3.I agree although this is not appropriate for the site I co-ordinate

4. I presume you mean patent rights and not patient rights?

5. We could do more on this

Table 6: Indicate When Last Updated

4. It is important that these Web sites indicate when they were last updated.

<u>Response</u>	<u>Percent</u>	<u>Response Count</u>
Strongly Agree	40.0%	14
Agree	48.6%	17
No Opinion	8.6%	3
Disagree	0.0%	0
Strongly Disagree	2.9%	1
Mean		1.771428571
Answered question		35
<u>Skipped question</u>		<u>0</u>
Comments		3

1. It is very useful in terms of gauging how up to date a site might be, but it is only a gauge
2. Depends- my site is just a redirect of sorts to a contact- there's no time-sensitive info.
3. A nice to have.

Table 7: Update Sites Regularly

5. It is important that these Web sites be updated on a regular basis.

<u>Response</u>	<u>Percent</u>	<u>Response Count</u>
Strongly Agree	40.0%	14
Agree	51.4%	18
No Opinion	5.7%	2
Disagree	2.9%	1
Strongly Disagree	0.0%	0
Mean		1.714285714
Answered question		35
Skipped question		0
<u>Comments</u>		<u>4</u>

1. Reviewed, not necessarily updated
2. Again, based on type of site
3. I think this depends on the content and how often it needs to be updated.
4. Especially for areas of medicine where things change often, such as HIV management

Table 8: Help Workers Make Decisions

6. It is important that the information on these Web sites help health workers make health care decisions.

<u>Response</u>	<u>Percent</u>	<u>Response Count</u>
Strongly Agree	17.1%	6
Agree	48.6%	17
No Opinion	22.9%	8
Disagree	8.6%	3
Strongly Disagree	2.9%	1
Mean		2.0
<u>Answered question</u>		<u>35</u>
Skipped question		0
Comments		10

1. But not always. It is not imperative. The criteria for selection of EHL include, but are not limited to, clinical knowledge for health workers

2. Not always. HINARI has plenty information for researchers.

3. I can only speak from the viewpoint of the website I am involved with and health workers are only one group of the audience we try to reach. The web content ‘may’ help health workers make health care decisions, but they may also use it more generally to inform the way that they work.

4. Depends on scope of Web site

5. Again, based on type of site

6. Agree, but how do we decide what helps many different health workers make many different decision. Seems a bit idealistic to me. How about “contain content that would be useful to

program managers in improving their programs?

7. It is helpful if the information helps in decision making, but not very important. The information may lead to sources of help in decision making

8. there are other reasonable goals, as well

9. Only if that is the goal of Essential Health Links.

10. My site is not health care specific

Table 9: Site Content Should be of High Quality

7. It is important that these Web sites contain high quality health care content.

<u>Response</u>	<u>Percent</u>	<u>Response Count</u>
Strongly Agree	37.1%	13
Agree	45.7%	16
No Opinion	11.4%	4
Disagree	2.9%	1
Strongly Disagree	2.9%	1
Mean		1.885714286
Answered question		35
<u>Skipped question</u>		<u>0</u>
Comments		6

1. But not always. It is not imperative. The criteria for selection of EHL include, but are not limited to, clinical knowledge for health workers

2. Public Health is not always health care related.

3. Again, based on type of site

4. In sites like ours, we have links to Journal publishers, booksellers etc. While those websites are not exactly health care content - they are indirectly related to health care content
5. It's important for any site to contain high quality content. The "health care" aspect is implied only by inclusion on the Essential Health Links page.
6. My site is not health care specific

The next eight items deals with cultural sensitivity on the Web.

Table 10: Objective Tone

8. It is important that these Web sites maintain a tone best described as objective.

<u>Response</u>	<u>Percent</u>	<u>Response Count</u>
Strongly Agree	50.0%	17
Agree	44.1%	15
No Opinion	2.9%	1
Disagree	0.0%	0
Strongly Disagree	2.9%	1
Mean		1.676470588
Mean of items 1-8		1.80262605
Answered question		34
<u>Skipped question</u>		<u>1</u>
Comments		3

1. What is importnat is that they *are* objective, not that they have an objective tone
2. Objective is also a position, a choice to be unaligned with a religious orpolitical group...a Sweden for example. This clause would eliminate many good religious charities.
3. But it is impossible to completely avoid bias.

Table 11: Provide Feedback

9. It is important that these Web sites include a mechanism for providing feedback, such as a Contact Us page with an e-mail link back to the site manager.

<u>Response</u>	<u>Percent</u>	<u>Response Count</u>
Strongly Agree	62.9%	22
Agree	34.3%	12
No Opinion	2.9%	1
Disagree	0.0%	0
Strongly Disagree	0.0%	0
Mean		1.4
Answered question		35
<u>Skipped question</u>		<u>0</u>
Comments		3

1. This is true of all websites

2. Not only the site manager, what about the Technical Officer?

3. or a form.

Table 12: Understandable Content

10. Information on these Web sites should be written in such a way that the target audience understands it completely.

<u>Response</u>	<u>Percent</u>	<u>Response Count</u>
Strongly Agree	47.1%	16
Agree	47.1%	16
No Opinion	5.9%	2
Disagree	0.0%	0
Strongly Disagree	0.0%	0
Mean		1.588235294
Answered question		34
<u>Skipped question</u>		<u>1</u>
Comments		8

1. This is true of all websites
2. To the extent possible
3. Members of audiences have different knowledge levels, needs and learning styles so I would never expect to write something that a collective group would understand “completely”. There is too much variation in an audience for one size fits all.
4. Translation option important
5. Again, what does that mean? And doesn’t it depend on who the target audience is. Can a web site be accessible to all target audiences equally?
6. tough in an international environment

7. This is a rhetorical question, unless you have a different idea of “target audience” than the owners of the web site

8. Tricky to achieve to a global audience!

Table 13: Consider Feedback about Textual Content

11. It is important that these Web sites carefully consider prior feedback from users when updating the sites’ textual content.

<u>Response</u>	<u>Percent</u>	<u>Response Count</u>
Strongly Agree	31.4%	11
Agree	60.0%	21
No Opinion	8.6%	3
Disagree	0.0%	0
Strongly Disagree	0.0%	0
Mean		1.771428571
Answered question		35
<u>Skipped question</u>		<u>0</u>
Comments		1

1. This is true of all websites

Table 14: Well-Defined Target Audiences

12. It is important that the target audiences of these Web sites be clear to the sites' users.

<u>Response</u>	<u>Percent</u>	<u>Response Count</u>
Strongly Agree	22.9%	8
Agree	54.3%	19
No Opinion	22.9%	8
Disagree	0.0%	0
Strongly Disagree	0.0%	0
Mean		2
Answered question		35
<u>Skipped question</u>		<u>0</u>
Comments		6

1. This is true of most websites

2. I dont understand this question.

3. One site might have more than one target audience, different content for different audiences but all contained within the same site.

4. This question is confusing

5. In what way? I don't need to have big links on my home page that say "DOCTORS CLICK HERE" or "PATIENTS CLICK HERE" or "JOURNALISTS CLICK HERE". We write for our target audiences -- plural -- and everyone else will figure it out, if they really want it. We can't worry about everyone.

6. We could do more on this.

As items 13 and 14 below indicate, developers of these Web sites have many audiences to target, from anthropologists to technologists. As Gastel (1998, p. 99) shows, audiences have other important facets than occupation. Nielsen (2000, p. 10-11) calls the audience equation “simple.” Unlike product and software design, in which customers pay now and experience usability thereafter, Web customers experience usability issues first and pay later (e-commerce).

Table 15: Target Health Audiences

13. These Web sites should be designed to be useful to (You may choose one or more response):

	Percent	Response	Rank
Workers at primary care health centers (clinics)	77.1%	27	1
Workers at regional hospitals	68.6%	24	4
Workers at tertiary care or referral hospitals	60.0%	21	5
Workers at ministries of health	71.4%	25	3
Workers at international health organizations	74.3%	26	2
Consumers/patients	48.6%	17	6
Not sure	11.4%	4	8
Other (please specify)	42.9%	15	7
Answered question	35		
Skipped question	0		

Other:

1. Researchers, Health Managers, Medical Teaching, Health Journalists.
2. students
3. Will vary by site

4. international development organisations and (for the website I am involved with) people with disabilities and disabled people's organisations, policy makers etc

5. Depends.

6. again- type of site

7. Workers at primary health care centers would probably need information in local languages.

How about community-based workers, workers for local NGO?

8. Students who wish to access such information for learning or self development purposes

9. Educational Institutions in the field of health care

10. Any one of these audiences is reasonable, a site doesn't need to serve everyone.

11. In our case, these audiences

12. policymakers and advocates

13. This is difficult to answer because different websites are designed for different audiences, so in principle all of the above audiences are important but they shouldn't necessarily all be catered for by a single website.

14. I find this question confusing. I have answered for my organisation

15. My site is not health care specific

Table 16: Target Professions

14. The health workers who should view these Web sites are primarily from which profession

(You may choose more than one):

	Percent	Response	Rank
Anthropologists	14.3%	5	T14
Epidemiologist	48.6%	17	10
Health communicators	65.7%	23	T2
Health learning material producers	54.3%	19	9
Health trainers	68.6%	24	1
Journal publishers	31.4%	11	11
Librarians	60.0%	21	T6
Medical doctors	65.7%	23	T2
Midwives	62.9%	22	5
Nurses	65.7%	23	T2
Policy makers	57.1%	20	8
Researchers	60.0%	21	T6
Technologists	31.4%	11	12
Not sure	14.3%	5	T14
Other (please specify)	25.7%	9	13
Answered question	35		
Skipped question	0		

Other

1. Dentistry, Economists

2. Will vary by site
3. maybe anthropologists and epidemiologists too.
4. Community members, health educators and health care providers (including public health workers) - primary. Funders, policy makers - secondary.
5. I believe these are our audiences based on surveys we conduct. I'm not sure what a technologist is.
6. Any of these is a reasonable audience.
7. In our case.
8. All of the above.
9. I find this question confusing. I have answered for my organisation

Table 17: Consider Feedback about Graphical Content

15. It is important that these Web sites carefully consider feedback from users when updating the sites' graphical content.

<u>Response</u>	<u>Percent</u>	<u>Response Count</u>
Strongly Agree	25.7%	9
Agree	57.1%	20
No Opinion	8.6%	3
Disagree	5.7%	2
Strongly Disagree	2.9%	1
Mean		2.028571429
Answered question		35
<u>Skipped question</u>		<u>0</u>
Comments		2

1. Yes, especially disabled users

2. It may be “nice to have” an opinion, but may not be really imperative. Professional designers with experience in such websites, are usually the best to plan the graphical content.

Table 18: English as a Second Language

16. It is important that these Web sites be usable by people for whom English is a second language.

<u>Response</u>	<u>Percent</u>	<u>Response Count</u>
Strongly Agree	31.3%	10
Agree	59.4%	19
No Opinion	6.3%	2
Disagree	3.1%	1
Strongly Disagree	0.0%	0
Mean		1.8125
Mean of items 9-12, 15-16		1.766789216
Answered question		32
<u>Skipped question</u>		<u>3</u>
Comments		10

1. It depends whether such people are part of the intended target audience. What matters is that such websites are available

2. If you want to be usable for people for whom English is a second language, you need to be careful oriented to topics they are interested for.

3. Other languages as well is funds and translation resources are available.

4. While it might be very beneficial, cost implications might prevent it.

5. To the extent possible
6. Where possible yes
7. Depending on country from which site being accessed. If LEP in US often intermediaries involved. Person may have literacy issues in primary language as well as English.
8. Depends on who the audience is but I would say yes.
9. Depends on the audience.
10. In our case this is important

The next four items deal with technology on the Web.

Table 19: Web Site Registration

17. It is important that these Web sites require registration.

<u>Response</u>	<u>Percent</u>	<u>Response Count</u>
Strongly Agree	3.1%	1
Agree	3.1%	1
No Opinion	21.9%	7
Disagree	43.8%	14
Strongly Disagree	28.1%	9
Mean		3.90625
Answered question		32
<u>Skipped question</u>		<u>3</u>
Comments		8

1. Registration is a barrier, even if it is free.
2. It is beneficial as interaction can take place between providers and users but is in not a requirement

3. Depends on the functionality of the site.
4. we have optional 'registration' if people want to be notified by e-mail of updates
5. Registration may be necessary for some features but not for everything.
6. I am not sure I understand what you mean by registration
7. Registration is a barrier to use. I can see requiring this before participating in online forums, but not just to look at information.
8. Registration is a barrier to consumption of information but does potentially provide benefits when trying to build communities.

Table 20: Dialup Modems

18. It is important that these Web sites be accessible with a dialup modem.

<u>Response</u>	<u>Percent</u>	<u>Response Count</u>
Strongly Agree	20.6%	7
Agree	55.9%	19
No Opinion	20.6%	7
Disagree	0.0%	0
Strongly Disagree	2.9%	1
Mean		2.088235294
Answered question		34
<u>Skipped question</u>		<u>1</u>
Comments		5

1. Although some websites may be intended for audiences that are almost exclusively broadband, in which case this is much less important.

2. That's a tough one. It depends on the web site and the audience.

3. I am not sure of the implications

4. Again, depends on the audience. We try to make our site dialup-friendly

5. We also have a CD version for low-bandwidth clients

Table 21: Loading Quickly

19. It is important that these Web sites load quickly, even if it means limiting graphics.

<u>Response</u>	<u>Percent</u>	<u>Response Count</u>
Strongly Agree	40.0%	14
Agree	37.1%	13
No Opinion	14.3%	5
Disagree	8.6%	3
Strongly Disagree	0.0%	0
Mean		1.914285714
Answered question		35
<u>Skipped question</u>		<u>0</u>
Comments		2

1. Although some websites may be intended for audiences that are almost exclusively broadband, in which case this is much less important.

2. We also have a CD version for low-bandwidth clients

Table 22: Novice and Advanced Users

20. It is important that these Web sites be usable for both novice and advanced Internet users.

<u>Response</u>	<u>Percent</u>	<u>Response Count</u>
Strongly Agree	42.9%	15
Agree	48.6%	17
No Opinion	5.7%	2
Disagree	0.0%	0
Strongly Disagree	2.9%	1
Mean		1.714285714
Mean of items 17-20		2.405764181
Answered question		35
<u>Skipped question</u>		<u>0</u>

Comments: 3

1. This is true of (almost) all web sites

2. Ideally, yes.

3. When is this *not* true?

Table 23: Scope of Site

21. My Web site linked off Essential Health is dedicated to:

<u>Response</u>	<u>Percent</u>	<u>Response Count</u>
A disease or syndrome (such as malaria)	32.4%	11
A body part (such as the eyes)	2.9%	1
A geographic region (such as sub-Saharan Africa)	14.7%	5
Other (please specify)	50.0%	17
Answered question		34
<u>Skipped question</u>		<u>1</u>

Other

1. Information management

2. HIFA 2015

3. General

4. worldwide public health

5. Health care in developing communities and countries.

6. Maximizing Access and Quality of Family Planning and Selected Reproductive Health Services.

7. strengthening the management, use and impact of information on health and disability

8. several refugee / immigrant groups and their providers in the US

9. a document delivery service

10. Family planning and reproductive health

11. Diseases of specific concern to developing countries

12. HIV/AIDS Training and information

- 13. Child Health Care related issues in particular.
- 14. We cover a range of related diseases, related to a set of body parts, in dozens of countries.
- 15. not sure as I's not familair with essential health
- 16. We feature health research covering a wide range of topics and in principle all developing countries.
- 17. Prevention of Blindness in low income populations

Table 24: Survey Respondent's Background

22. The person who completed this survey is:

<u>Response</u>	<u>Percent</u>	<u>Response Count</u>
A health care professional with Web design experience	14.3%	5
A health care professional with no Web design experience	2.9%	1
A Web developer with a medical background	14.3%	5
A Web developer with no medical background	34.3%	12
Other (please specify)	34.3%	12
Answered question		35
<u>Skipped question</u>		<u>0</u>

Other

- 1. Librarian
- 2. A web manager with 20 plus years' experience in the field of family planning and reproductive health.
- 3. a librarian with web experience
- 4. librarian with tech skills
- 5. A Web manager with no medical background

6. A medical librarian who heads an NGO that specializes in the area of Medical Information
7. Secretary
8. medical librarian - web-site manager and content provider
9. I'm an experienced medical publisher with no medical training.
10. A Web developer with no formal medical background (but I'm married to a doctor).
11. A web site owner who is not a trained medic. However, I'm a scientist who has answered clinical questions for 10+ years.
12. E-learning manager at the UN FAO

Table 25: Country of Origin

23. As manager of a Web site linked off Essential Health Links, I am based in (please specify the country):

Answered question 34

Skipped question 1

Other

- | | | | |
|-----|--------------------------|-----|---------------|
| 1. | United States | 23. | US |
| 2. | India | 24. | Switzerland |
| 3. | USA | 25. | Croatia |
| 4. | Italy | 26. | South Africa |
| 5. | UK | 27. | United States |
| 6. | Germany | 28. | United States |
| 7. | Switzerland | 29. | manila |
| 8. | Canada | 30. | US |
| 9. | South Africa | 31. | Wales |
| 10. | South Africa | 32. | UK |
| 11. | Baltimore, Maryland, USA | 33. | UK |
| 12. | UK | 34. | Italy |
| 13. | US | | |
| 14. | USA | | |
| 15. | USA | | |
| 16. | United States | | |
| 17. | Switzerland | | |
| 18. | United Kingdom | | |
| 19. | Kenya | | |
| 20. | India | | |
| 21. | India | | |
| 22. | The Netherlands | | |

One respondent skipped item No. 23, which asked which country the respondents were from. The other 34 respondents are from: the United States (11), the United Kingdom (six), India (three), Switzerland (three), South Africa (three), Italy (two) and one each from Canada, Croatia, Germany, Kenya, the Netherlands and the Philippines.

Part III: Core Principle

The core principle of the digital research cycle is that Any successful communication of a computer-mediated message in the information age is a behavior that is influenced by the sender and receiver's attitudes and knowledge about textual style, the audience, the technology or distribution method and the subject matter to which the message pertains. This researcher conducted a literature review to determine best practices in each of these areas, as they relate to building Web sites to be viewed by health workers in low-income countries. In the survey herein, the senders are Web developers, the people who built the Web sites designed for low-income countries that are linked off Essential Health Links. The receivers are the health workers in those low-income countries. Through looking at the results (mean scores) of each item on this survey, one can determine whether and how much the senders' attitudes and knowledge match the best practices reflected by each item. The first goal was to generate means for each item. The second goal was to arrange the items into groups to show how respondents compare on the combinations of best practices related to content, cultural sensitivity and technology.

Part IV: Individual Item Means

Using the Likert Scale, a response of Strongly Agree generated a score of 1 and a strong agreement with the best practice mentioned in the item. A response of Agree netted a score of 2 and an agreement with the best practice mentioned in the item. A response of No Opinion netted a score of 3

(neutral) and no opinion about the best practice mentioned in the item. A response of Disagree netted a score of 4 and a disagreement with the best practice mentioned in the item. A response of Strongly Disagree generated a score of 5 and a strong disagreement with the best practice mentioned in the item.

Table 26: Mean Scores on Each Item

Item	Mean Score	Item	Mean Score
Q1	2.058823529	Q18	2.088235294
Q2	1.542857143	Q19	1.914285714
Q3	1.771428571	Q20	1.714285714
Q4	1.771428571		
Q5	1.714285714		
Q6	2.0		
Q7	1.885714286		
Q8	1.676470588		
Q9	1.4		
Q10	1.588235294		
Q11	1.771428571		
Q12	2		
Q15	2.028571429		
Q16	1.8125		
Q17	3.90625		

Part V: Grouped Means

Each individual Likert Scale item is similar in scope to several other items. Items 1-8 relate to content, the subject matter of the sites that were developed. Items 9-12 and 15-16 relate to cultural sensitivity and the sites' audiences. Items 17-20 relate to technology and how it impacts the Web developers and their audiences. As shown above, means of respondents' answers can be combined to show how the respondents scored on these three groups of items. After mean scores were generated for respondents on each item (Tables 10-21, 24-29), means were added together based on the three categories mentioned above: Items 1-8 were added together. Items 9-12, 15 and 16 were added together. Items 17-20 were added together. This researcher then divided cumulative scores by the number of items in each grouping (eight, six and four, respectively), to determine the average means for each group (Table 27). Using the 1-5 scale, these average means represent the degree to which the respondents agree with this researcher on best practices. Respondents' answers generated these grouped means:

Table 27: Grouped Means

<u>Topic</u>	<u>Mean</u>	<u>Items</u>
Content	1.80262605	Questions 1-8
Cultural Sensitivity	1.766789216	Questions 9-12, 15-16
<u>Technology</u>	<u>2.405764181</u>	<u>Questions 17-20</u>

These grouped means indicate that respondents agree slightly less than strongly on best practices related to content and cultural sensitivity and the least on best practices related to technology. There are several possible reasons for these results. One could be the large amount of respondents (23 of 32 or 71.87 percent) who disagree with the best practice that registration should be required for these Web sites (Table 19), and the corresponding high mean (3.90625) on that item. Three respondents referred to

registration as a “barrier.” Another reason could be the types of sites they are managing (Table 23). Eleven of the respondents (32.4 percent) have sites dedicated to a disease or syndrome (such as malaria). Five (14.7 percent) have sites dedicated to a geographic region. One site (2.9 percent) is dedicated to a body part. Other responses were: information management; HIFA 2015 (an online bulletin board dedicated to health care and technology); general; worldwide public health; health care in developing communities and countries; maximizing access and quality of family planning and selected reproductive health services (this could be classified as “body part;” strengthening the management, use and impact of information on health and disability; several refugee/immigrant groups and their providers in the United States; a document delivery service; family planning and reproductive health (another possible “body-part” site listed as “other”); diseases of specific concern to developing countries; HIV/AIDS Training and information (this site is dedicated to a “disease or syndrome”); child health care related issues in particular; a range of related diseases, related to a set of body parts, in dozens of countries; health research covering a wide range of topics and in principle, all developing countries; and prevention of blindness in low-income populations (another possible body-part site).

Another reason for these results could be the backgrounds these Web developers ascribe to themselves (Table 24). Twelve (34.3 percent) are Web developers with no medical background. Five (14.3 percent) are health workers with Web design experience. Five others are Web developers with medical backgrounds and one (2.9 percent) is a health care professional with no Web design experience. There were other responses, including: librarian; a web manager with 20 plus years’ experience in the field of family planning and reproductive health; a librarian with web experience; a librarian with technological skills; a Web “manager” with no medical background; a medical librarian who heads an NGO that specializes in medical information; a secretary; a medical librarian-Web site manager and

content provider; an experienced medical publisher with no medical training; a Web developer with no formal medical background; a Web-site owner who is not a trained medic, who is a scientist who has answered clinical questions for more than 10 years; and an E-learning manager at the United Nations Food and Agricultural Organization. Still another reason for the results could be the countries these developers are from (Table 28). Nearly one-third (11) of the respondents are from the United States. More than half (18) are from: Anglo-Western countries (United States, United Kingdom and Canada). The other 16 respondents are from: India (three), Switzerland (three), South Africa (three), Italy (two) and one each from Croatia, Germany, Kenya, the Netherlands and the Philippines. Below is a comparison of the 12 countries, by rank by country, country names, number of respondents and each country's rank on technological readiness, from among 134 countries (World Economic Forum, 2008).

Table 28: Countries of Origin

RBC	Country Names	Number	Readiness Rank
1.	United States	11	11
2.	United Kingdom	6	8
3.	India	3	89
3.	Switzerland	3	5
3.	South Africa	3	49
6.	Italy	2	31
7.	Canada	1	9
7.	Croatia	1	47
7	Germany	7	18
7.	Kenya	1	93
7.	Netherlands	1	1
7.	Philippines	1	70

Part VI: Statistical Tests

Working with Nazim Uddin, Ph.D., in the University of Central Florida's Department of Statistics and Actuarial Science, this researcher used SPSS 16 Grad Pack software to conduct a univariate analysis of variance to determine whether to reject the hypotheses (Appendix H and Appendix I). Using a 95 percent confidence interval, it was determined that there is no significant difference in Web developers' attitudes toward meeting the customer's need for high-quality content, and their attitudes toward meeting the cultural needs of their audience. However

it was determined that there is a significant difference in Web developers' attitudes toward meeting the customer's need for high-quality content, and their attitudes toward meeting the technological needs of their audience. It also was determined that there is a significant difference in Web developers' attitudes toward meeting the cultural needs of their audience, and their attitudes toward meeting the technological needs of their audience. These results may well be due to the overwhelming disagreement with the best practice proposed in item No. 17 (Table 19), that the Web developers' sites should require registration.

Part VII: Best Practices

Input from Respondents

Best Practice: Item 1

The first best practice is that Web sites linked off Essential Health Links should include a link to some sort of verification that the site contains accurate content. The receiver of content on one of these sites needs to know that the content he or she is receiving from the sender has been vetted and confirmed to be accurate, to the greatest extent possible. Accuracy of content can be conveyed using a graphical or textual link from the homepage to a page where — using a technical writing style — the developer can explain how and when the site's content was vetted.

More than 73 percent of the respondents agree with this practice. Only one respondent strongly disagrees. The respondent who made the first comment was correct that “[a]ssessment of likely accuracy of content is complex.” The second commenter noted that HINARI sites do not need verification. HINARI, an online database of more than 3,750 journal titles that can be accessed by health workers in 113 countries, lists as its “main requirements for participation”

that the journals be “in the biomedical and social science fields, and that they be available online in their full text version” (HINARI, 2008). No mention is made of the accuracy of the sites’ content. Another respondent cited documentation as an important consideration (“[H]ow materials [are] created may be as important as ‘verification.’ ”). Three questions were the focus of a study of search engine performance by Berland et al. (2001): “1. How comprehensive is the information on selected e-health Web sites?” “2. How accurate is it?” and “3. How often do Web sites provide documentation that allows one to assess the source or currency of the material?”

What about the certification process, as one respondent commented? Would it be costly? Since there is no fee to be HON certified, one assumes the respondent is referring to his internal costs for improving his site to the point where it would be eligible for HON certification. One respondent wonders how — if he is the source of new information — an independent party could verify that information. “Whose definition of ‘accurate’ would you like?” the respondent wrote. “We deal with some controversial topics, and although we believe that we present the issues accurately, I assure you that many people feel differently.” Another respondent’s statement that his organization’s link with the London School of Hygiene & Tropical Medicine “provides assurance of the quality of” the site’s content. The Hygiene Centre at the London School of Hygiene & Tropical Medicine presently partners with other organizations on a number of programs, including: Unilever, for a hygiene center, where researchers are working on “health and hygiene initiatives” as well as behavior change; the World Bank-sponsored Water and Sanitation Programme for the installation of a Sanitation Marketing Network in two countries in Africa; the Global Public-Private Partnership for Hand washing with Soap; the World Bank-sponsored publication of *Health in Your Hands*, with lessons learned from those public-private partnerships; *The Hand Washing Handbook*, published by the World Bank; WELL, a resource

center network for water, sanitation and environmental health; and the International Water Association (IWA) (London School of Hygiene & Tropical Medicine, 2008).

Adam Biran, Ph.D., of LSHTM says in personal communication with this researcher that he has never encountered a standard LSHTM procedure for vetting partners.

Partnerships tend to be formed fairly opportunistically — usually in response to an opportunity for research funding. For nearly 10 years the unit I work in ran a resource centre known as WELL. Initially this was a partnership between LSHTM and WEDC [Water Engineering Development Centre] at the University of Loughborough. We then expanded to include a number of developing country partners as well as IRC (the International Resource Centre in Delft). WELL was a source of information on water and environmental health - largely accessed through our website. We had an internal QA procedure. Initially outputs from LSHTM would be reviewed by somebody in WEDC and vice versa. When the organisation expanded our Technical Director (the most senior environmental health academic at LSHTM) was given responsibility for QA of all outputs. However, towards the end of our contract the volume of our outputs (mainly short guidance notes) grew considerably and the burden of QA had to be shared. This meant that any of our staff with sufficient time and a reasonable knowledge of the field would read over an output and check for gross errors (Biran, personal communication, August 27, 2008).

Best Practice: Item 2

The second best practice is that these Web sites identify or link to the sources of their content. This could be done by linking words within the text directly to the referenced sites or by

linking subtext numbers within the text to a bibliography at the bottom of that page, which would include links to the referenced sites. More than 97 percent of the respondents agree with this statement, and one respondent did not understand the questionnaire item. It is presumed that a large number of respondents agree because sourcing distinguishes academic research and writing from other types of research and writing. One of the elements of the HONCode is to “Cite the source(s) of published information, date and medical and health pages” (Health On the Net Foundation, 2008b). Likewise, when the European Commission was reportedly planning to publish a code of practices for Web sites, one of the “core” elements of the code was “Authority—by sourcing and dating all information displayed and providing full credentials of individuals and institutions (Watson, 2002). Both the American Psychological Association (APA) and the Modern Language Association (MLA) offer standards for citing references found in electronic publications such as Web sites. But what is important here is citations linking one Web page to another. Some Web developers have designed a compromise. In some examples, academic citations can appear on a page after the user clicks on “View Academic Citations” and disappear when she clicks in the same space, while it says “Hide Academic Citations.” A Medblog (2008) site uses this method, hiding and showing the same citation written in American Medical Association, APA, Chicago, Harvard and MLA styles.

Best Practice: Item 3

The third best practice is that these Web sites include disclaimers, about confidentiality of data and patient rights, when appropriate. Often, such disclaimers are linked off the bottom of the home page, near the copyright link. More than 85 percent of the respondents agree with this statement. With the Internet and its World Wide Web’s immense capacity for storing data, there is a tremendous potential for abuse. Any disclaimer that purports to protect a patient’s rights or

records on a site must have credibility. Two guidelines of the Association for Computing Machinery are: to “Respect the privacy of others” and to “Honor confidentiality” (Association for Computer Machinery, 2008). Meanwhile, Computer Professionals for Social Responsibility (2006) joined with 25 other organizations in the Coalition for Patient Privacy in sending a letter to Congress urging them to build a patient-centered health care system, with patient privacy rights as the core of the American health IT system. Such a system could be a model for low-income countries — and non-profit organizations that work in them — to follow.

Best Practice: Item 4

The fourth best practice is that these Web sites indicate when they were last updated. Thirty-one respondents agreed and three had no opinion. One respondent said “Last Updated” notations are “very useful in terms of gauging how up to date a site might be, but it is only a gauge.” Another said its usefulness “Depends — my site is just a redirect of sorts to a contact—there’s no time-sensitive info.” A third called the notation a “nice to have.” A “Last Updated” notation should be listed somewhere near the bottom of the homepage. Otherwise it will get “lost” on a busy page. Another approach is to list when individual stories were posted, near a link to the story. Many sites list the date a story is posted. A more detailed approach is taken by International Development Research Centre of Canada, which lists at story level: 1) a story ID number; 2) the date and time the story was added to the site; 3) the date and time the story was “modified” and 4) the date and time the story was refreshed. Some call this notation a site’s “currency” (University of New Hampshire at Manchester, 2008). The UNH-M site states that one should be able to find out from a Web site when it was last updated. “[O]utdated medical information on the Internet can potentially be dangerous” (UNH-M).

Best Practice: Item 5

The fifth best practice is that these Web sites be updated on a regular basis. This item is similar to Best Practice 4. Readers expect updated sites and benefit when they are told that sites are updated. Thirty-two of the respondents agreed. However, while one said they should be reviewed, not updated, others said it depends on the type of site and on the content. Some health-related sites need to be updated often. One example is HIV management, as the respondent states. There are 27 HIV-AIDS/Diagnosis and Management sites linked off Essential Health Links. Twelve are focused on low-income countries. One such site, aidsmap, promises “more original, daily news on developments in the world of HIV than any other HIV website” (NAM, 2008). Another site, Family Health International, includes a link to a document titled Delivering Antiretroviral Therapy in Resource-Constrained Settings: Lessons from Ghana, Kenya and Rwanda. Published in August 2005 by Robert Ritzenthaler, this document may now contain incorrect, incomplete or outdated information. Anderson, Allee, Chung and Westra (1999) worked on The Megasite Project during the 1990s, comparing health information megasites and search engines. They studied 25 Web sites and compared their target audiences, who select the sites linked off those 25 sites and their update frequency. They found that the update frequency of 12 of the sites was unstated. Two sites — Virtual Hospital and Medical Matrix — were updated continuously. Exact dates of most recent updates for two of the remaining 11 sites — WebDoctor (1997) and WWWVL: Medicine (1996) — are shown. The last modified dates of the other nine sites are said to range as follows:

- Within one week (4 sites)
- Within two weeks (2)
- Within one month (2)
- Within two months (1)

(Anderson, Allee, Chung and Westra, 1999).

Best Practice: Item 6

The sixth Best Practice is that information on these Web sites help health workers make health care decisions. As item No. 14 shows, people in many professions could benefit from viewing the Essential Health Links. As shown in item No. 13, several different types of health workers could benefit. More than 8 in 10 of the respondents agree that it is a best practice to put content on the sites that helps health workers to make health care decisions. One respondent wrote that it is not an imperative. Since the audience is so varied (“My site is not health care specific,” one respondent wrote.) and since one of the three primary Essential Health Links categories is Library and Publishing Support (unrelated specifically to health care), some of these sites may never help health care workers make health decisions (For example that will not be necessary on a site built for anthropologists). But the results show that the vast majority of the respondents believe that helping health workers make health care decisions is part of their site’s mission. Another points out that HINARI includes “plenty information for researchers.” Perhaps an item in a follow-up questionnaire could read “Information on these Web sites helps health researchers make decisions in their work.” One respondent believes information on the sites can be used not just to make better health care decisions, but also to improve how he or she functions as a health worker. “I can only speak from the viewpoint of the website I am involved with and health workers are only one group of the audience we try to reach,” the respondent wrote. “The

web content ‘may’ help health workers make health care decisions, but they may also use it more generally to inform the way that they work.” Good examples of this are all of the Essential Health Links sites linked off the “Medical Education and Clinical Skills” subcategory. Two respondents made similar comments that are common in other areas of this research. Both essentially wrote that their responses depend on the type or scope of each individual site. One wrote, “There are other reasonable goals, as well.” Another respondent calls this best practice “idealistic.” The respondent says why not state the item more generally: These Web sites should “contain content that would be useful to program managers in improving their programs?” and asks how we decide what helps many different health workers make many different decisions. Another respondent implies that the Essential Health Links sites only scratch the surface of health information. “It is helpful if the information helps in decision making, but not very important. The information may lead to [other] sources of help in decision-making.”

Best Practice: Item 7

The seventh best practice is that it is important for these Web sites to contain high-quality health care content. High-quality content is one of the four key issues in the digital research cycle. Without it, no communication is worth making, unless one’s goal is to deceive. Nearly 83 percent of the respondents agree. Some among the 17 percent who do not agree may be developers whose Essential Health Links sites are not specifically about health care. Because of the many challenges presented by the elements revealed by the digital research cycle, the quest to provide digital health care information in low-income countries faces many obstacles: Poor choices on the sender’s end; poor technology on the receiver’s end; cultural differences between sender and receiver; determining the proper textual style to reach the receiver. Thus it is incumbent upon the Web developer to assure that these obstacles are counteracted by the

presence of quality content.

One respondent stated that quality content “is not imperative. The criteria for selection of EHL [Essential Health Links] include, but are not limited to, clinical knowledge for” health workers. Another stated that public health “is not always health care related.” Another said: “It’s important for any site to contain high quality content. The ‘health care’ aspect is implied only by inclusion on the Essential Health Links page.”

Best Practice: Item 8

The eighth best practice regards the importance of these Web sites maintaining “a tone best described as objective.” Some 32 of 34 respondents agree. Several respondents take exception with the way the item is worded, saying the fact that the sites are objective is more important than an objective tone. The term “objective tone” is used in the questionnaire item because it is more specific than “objective.” Another respondent pointed out that objectivity is a position, or choice, such as a neutral observer’s role. This requirement could eliminate religious organizations from participating in a project, the respondent implies. The comment evoked this researcher’s memory of being told that the Bishop Masereka Christian Foundation in Kasese, Uganda, was unable to secure grants from the Bill & Melinda Gates Foundation because of its Christian status. (Where Christianity is concerned, Bishop Zebedee Masereka is not objective.) A third respondent wrote that it is impossible to completely avoid bias. Knowledge of this fact also led to this researcher using the phrase “a tone best described as objective.”

One of the reasons faith-based organizations have been denied funding in the past is the perception that some of these organizations took an unscientific approach to HIV/AIDS in the early years of that disease. Specifically, some have referred to AIDS as a “gay disease” or a “curse from God.” Despite the early stigma that faith-based organizations placed on AIDS

sufferers, and despite their lack of objectivity relating to their promotion of their faith over others, some of these organizations are finding success. For example, in Swaziland, where 45 percent of the new cases of AIDS involve patients who are ages 15-25, one organization is attempting a faith-based approach to prevention. “It introduces youth to the personal Jesus and just his mission, and talks about issues that youth are dealing with,” said Megan Nygyforchyn-Clark of Reach4Life. “It makes the Bible, for youth that maybe have not been exposed to it, relevant to the issues that youth are struggling with” (Mission Network News, 2007). The 40-week program is taught in schools, with lessons that cover sexuality, poverty, drugs and alcohol, pressure from work and school, self-image and dating. This article does not state specific quantifiable data but says response has been “overwhelming” and that “they are receiving testimonials of how the program has helped” (Mission Network News).

Best Practice: Item 9

The ninth best practice is that these sites have a mechanism for providing feedback. Ninety-six percent agreed. One respondent had no opinion. One respondent stated that this is true of all Web sites. Another said feedback could be gathered on a form. A third stated that the site’s technical officer also should have a feedback mechanism. Feedback is especially important on health care Web sites, where not understanding the subject matter could result in a death. Also, the site developer in this case should be eager to receive feedback because the person sending it may have new and important information about a treatment or a cure that the developer or his medical staff does not have. Despite the advantages of receiving feedback, it should be viewed with some skepticism. Dellarocas (2008) says feedback is important, but “getting a true picture from online feedback is not always as easy.” This is because “reporting bias” is a strong

possibility. Users and customers primarily report positive experiences in their feedback. They reason that reporting negative experiences will leave them susceptible to retaliation (Dellarocas).

Best Practice: Item 10

The 10th best practice is that these Web sites should be written in such a way that the target audience understands them completely. Ninety-four percent agreed. As with the previous item, one response was that this is true of all Web sites. Another stated that it should be done “to the extent possible,” which possibly alludes to the fact that the word “completely” is used. What about learning styles? One respondent wrote, “Members of audiences have different knowledge levels, needs and learning styles so I would never expect to write something that a collective group would understand ‘completely.’ There is too much variation in an audience for one size fits all.” Another respondent states that having a “translation option” is important. Another respondent asks, “Can a web site be accessible to all target audiences equally?” Others call this “tough in an international environment” and “tricky to achieve to a global audience.” Finally, one respondent calls this a “rhetorical question, unless you have a different idea of ‘target audience’ than the owners of the web site.” Regarding this final comment, this Best Practice is based on the premise that developers need to be reminded to learn who their target audience is. This researcher respectfully disagrees with the respondent. One of the key facets of the digital research cycle is that Web developers and writers often use textual styles that are not appropriate for their audience even when they do not intend to, specifically because they do not carefully study which textual style they should use. They merely assume their audience will understand content written at the same level of abstraction or “fog” with which the writer is comfortable. In this case the respondent is privileging textual style over the needs of the audience. One of the tenants of the digital research cycle is the importance of giving equal consideration to both

textual style and to audience, as well as technology and content. Still, perhaps this best practice should state, “these Web sites should be written in such a way that the target audience understands them ‘as much as possible’ “ rather than “completely.”

Best Practice: Item 11

The 11th best practice is that developers of these Web sites should carefully consider prior feedback from users when updating the sites’ textual content. More than 91 percent of respondents (or 32) agree. Customer surveys generate unscientific data, but they can be useful. Feedback is an essential tool in the updating and redesign of Web sites. They are a key element in an effort to make a Web site seem spontaneous, like a live performance. To avoid confusion, links to feedback mechanisms should say “Contact Us” rather than the e-mail address itself (Nielsen & Tahir, 2002, p. 191). Golec (2004) refers to two types of feedback: positive and negative. Positive feedback occurs when “the resulting action goes in the same direction as the condition that triggers it.” For example, if a Web site offers a service and feedback indicates that customers like that service, and the developer provides more of that service, then a positive feedback mechanism has occurred. Conversely, a negative feedback mechanism occurs on the Web when — after statistics show that a homepage of a Web site is not popular, is not visited often or is not visited for long periods of time — the developer changes the content on the page. If one thinks of a Web site as a place to go to and spend time, then sites are analogous with hotels. In the same way that hotel chains use Web forms to generate feedback about their franchisees, a site about health care can use Web forms to generate feedback about the surfer’s experience at that site. Hotel guests have a number of sites to go to — among them TripAdvisor, Igoyougo.com and HotelChatter.com — to read and post opinions about lodging properties (Burns, 2007). For more than 20 years Press Ganey has focused on health care performance

measurement, including sending evaluation surveys to recent patients of hospitals (Press Ganey, 2008). Perhaps a Web site should be created where people can go to critique sites about health care. Government, corporate and organizational Web sites benefit from collecting online feedback, not just about a central product or service, but also about the organization's Web site.

Best Practice: Item 12

The 12th best practice regards the notion that the target audiences of these Web sites must be clear to the sites' users. More than 77 percent of the respondents (or 27) agreed. Eight had no opinion. While two respondents indicated that they found the question confusing, four others also offered comments. Two state that a Web site may have more than one target audience. "I don't need to have big links on my home page that say "DOCTORS CLICK HERE" or "PATIENTS CLICK HERE" or "JOURNALISTS CLICK HERE," the respondent wrote (capitalizations theirs). "We write for our target audiences -- plural -- and everyone else will figure it out, if they really want it. We can't worry about everyone."

This is a faulty approach. Web developers should be active, not passive, when attracting an audience. Web developers should determine who their target audience is and then design their site so that anyone can determine by glancing at the homepage whether or not they want to stay there. According to a report (Ranger, 2007), Europeans on average accessed the Internet — from home and work — some 16.5 days per month. During a total of 24 hours, they each viewed 2,662 Web pages. These numbers are presented to illustrate that a wise developer realizes there is much competition for a user's eye. By customizing a site to entice one's target audience to stay, one has the added benefit of giving subtle clues to the non-target audience that this site is not what they are looking for. Gastel offers advice to journal article authors, which is useful for Web developers as well:

Before crafting a piece of health writing, assess the audience. Consider its age, its education, its knowledge level, its interests. Consider whether the piece should have a local emphasis. Look carefully at other articles in the same publication or on the same Web site, or attend carefully to other stories on the same broadcast program. Pay particular attention to the vocabulary level, lest you, having reviewed materials such as journal articles, tend to lapse into technical jargon [when inappropriate]. Check with the editor, who is likely to be well attuned to the audience being served (Gastel, 2005, p. 99).

Best Practice: Item 15

The 15th best practice regards the importance of ensuring that developers of these Web sites carefully consider feedback from users when updating the sites' graphical content. Eighty-two percent or 29 respondents agreed. Three respondents (8.6 percent) disagreed. Typical users do not read Web sites thoroughly. They scan them briefly and make quick decisions to stay or to go elsewhere. Thus it is imperative to give the user what he or she expects first, then what the developer believes he or she should have later. In other words: draw them in with graphics, keep them with words. Tilton (2004) explains that the Web's primary draw is not "hypertext, and it is not an easy interface; the main attraction is the flashy graphics and the alluring promise of multimedia." But rather than having many graphics on a site — which can then look cluttered, and load slowly —or few graphics on a site, which will then load quickly but look "gray," each site should have the right quantity and the right types of graphics. It is the Web developer's responsibility to ensure that the graphics on his or her site match the expectations of the user. Localization, also known as customization or adaptation, is the process by which a specific culture is incorporated into a product. In the case of a Web site, color and graphics are key

elements of localization in addition to language. A Web site about Uganda, for example, may incorporate black, yellow and orange colors because they are in the Ugandan flag. One example of this is the tourism site, VisitUganda.com (2008), which has all three of these colors in its scheme.

Best Practice: Item 16

The 16th best practice regards the importance that these Web sites be usable by people for whom English is a second language. Twenty-nine respondents agreed; one disagreed. There were numerous comments. One respondent stated, “It depends whether such people are part of the intended target audience. What matters is that such websites are available.” This is accurate by default. It would seem reasonable to assume that a developer would only include Web site translations for languages of target audiences. Another wrote that “If you want to be usable for people for whom English is a second language, you need to be careful oriented to topics they are interested” in. This relates back to carefully considering feedback about a Web site’s content and graphics. Feedback — in the form of comments or user data — is the only way to know if a site is effective.

Translation is available but is expensive. According to one vendor, “The cost of translating a web site can range from a couple of thousand dollars to more than a hundred thousand dollars depending on the size of your site and the services you need” (wintranslation.com, 2008). Two respondents wrote “where possible” and “to the extent possible,” as if to say “it does not matter that 30 percent of the audience speaks Lugandan, we are going to publish the site only in English.” English is the “official” language of Anglophile African countries such as Uganda, a situation that is a holdover from British rule, which ended in 1962. The Uganda parliament — like other African parliaments — conducts its official business

in English. Virtually all business signs in Uganda are written in English. Those that are not written in English are written in Arabic, to appeal to the country's Muslim population. But English is not the language spoken by most Ugandans. In the capital city of Kampala, many speak Lugandan. In western Uganda, many speak Ruchiga. Still others in Uganda speak Swahili. Schmied (1995) looked at the use of English in three Anglophile countries in Africa: Kenya, Tanzania and Zambia. He states that English is deeply rooted in Zambia, it is somewhat rooted in Kenya and less rooted in Tanzania. Thus one who is developing a site for Zambian health workers would be less likely to need to include a native translation than one who is developing a site for Tanzania.

Best Practice: Item 17

The 17th best practice regards the importance of Web sites like these requiring registration. Twenty-three of 32 respondents disagreed with this item; more “disagrees” than on any other item. Three respondents called registration a “barrier.” Another said it is not a requirement but the transaction that takes place is beneficial. Some sites offer optional registration, which allows users to receive e-mail updates. Another respondent stated that the value of registration depends “on the functionality of the site.” By this the respondent likely means that if the site has many features — such as e-mail updates and e-commerce — user registration may be a reasonable requirement. Another respondent wrote that registration “may be necessary for some features but not for everything.” Registration has advantages and disadvantages. Advantages include all of the information a Web developer can learn about his site's users, as well as making e-commerce possible. Disadvantages include the possibility that requiring registration will scare away potential users, and that users will not want to give up that personal information. Of course one of the problems associated with new user registration is

spamming, as experienced by Internet Workshop, a “a family-owned, full-featured Web Hosting provider based in Tucson, Arizona.” Registrations at the site had to be approved manually because spammers were posting “inappropriate content” (**Internet Workshop, 2004**). This placed a burden on new users, who were asked to e-mail the site’s administrator after registering, “explaining briefly why you want to post stuff to bTucson and what your username is. We will enable you within a couple days” (Internet Workshop). As the technology or distribution method that Web developers use becomes more sophisticated, there are increasingly more ways sites can interact with their customers. For reasons related to marketing, privacy and security, these sites feel the need to require registration. Another reason, simply, is that registration tools function better than they did previously. An example of a group of sites that prioritizes privacy is the McClatchy Newspapers company, which has the following information on many of its newspapers’ Web sites: “We take your privacy concerns seriously and want to make every effort to address them as we strive to offer our site visitors a high quality, interactive and personalized experience” (Kansas.com, 2008).

Simon Okello, M.D., is a physician in Uganda, where modesty is emphasized (Okello, 2008). His thoughts about health information, culture and technology are mentioned in Chapter One and Chapter Six. Okello believes some form of security should be employed to keep non-health workers out of sites that show images of body parts. “If they are built for us to learn on, then they should be specifically for us who have an interest in learning the [medical] area, not for everybody, because definitely there are some images and some information that might be cultural negative to us. If they need to design one [health care Web site], it should be made in a way that it is only accessible to them that have an interest in it, so that the other part of the population is kept away from it. I think it would be positive.”

Best Practice: Item 18

The 18th best practice regards the importance that these Web sites be accessible with a dialup modem. More than 76 percent of the respondents (or 26) agreed. One strongly disagreed and seven had no opinion. It is ironic but true that the countries that have the most pervasive health care problems also have the least-effective means of solving those problems through use of information and communication technologies (ICT) (Missen & Cook, 2007). The cost of bandwidth in Africa is much higher than in developed countries, and “institutions in developing countries must often buy larger-capacity connections than they can realistically afford. For example, some universities in Africa are spending as much as the equivalent of 20 full-time faculty salaries for a 2-megabit Internet connection that is then distributed to 500 to 600 computers, resulting in a costly and painfully slow connection for everyone” (Missen & Cook). Western Web developers should be made aware of such situations. Some developers are aware and they are trying to compensate for low bandwidth. The International Network for the Availability of Scientific Publications (2008b) offers “workshops, training, advocacy and outreach activities” that are designed to help users generate more bandwidth and to manage it better.

Best Practice: Item 19

The 19th best practice regards the importance that these Web sites load quickly, even if it means limiting graphics. More than 77 percent of respondents (or 27) agreed. Three disagreed and five had no opinion. One wrote “some websites may be intedned [sic] for audiences that are almost exclusively broadband, in which case this is much less important.” Another wrote, “We also have a CD version for low-bandwidth clients.” Web developers have a choice. They can build a sophisticated Web site that loads slowly, or a plain Web site that loads fast; or they can

find a middle ground. Nielson and Tahir (2002) recommend making graphic design a lower priority in the Web design process than content (p. 23). When creating a Web page or site, like a newspaper page online, the graphics should show the developer's priorities. Large titles and photographs indicate the importance of a topic. However, too-large graphics or too many can make a site unreadable on some browsers. Meanwhile Flash technology can be used to improve a site's look, such as when a company called FutureVision was hired by Neurosurgery International to create a new logo for the NGO and to redesign its Web site. "We understood that a highly-experienced world-wide medical organization deserved our very best professional attitude and performance. Flash technology was a key in creating the new web-presence of Neurosurgery International" (FutureVision, 2008). This is a risky approach for an organization whose Web site (nsinternational.org) is a key element in its quest to improve "neurosurgical care through the use of internet communication" (Neurosurgery International, 2008). With such a goal, Neurosurgery International's Web site should be accessible on old and new computers, with either poor or excellent Internet connections. To confirm this need, one need only look at the Physician Exchange Program page on this site, which mentions connections with professionals in China, India and the Ukraine. However, FutureVision claims it did sufficient research when redesigning this site.

Flash technology was a key in creating the new web-presence of Neurosurgery International. We realized that a well-established organization would not be served well by amateur Flash authoring. Choosing from several suggested variants we settled on a 3 language system with Flash intro. As a world-wide web site usability was a principle concern, we differentiated between two target audiences, one with a screen resolution of 800x600 and the other one with 1024x768 or higher. It was made to guarantee the best visual appearance of embedded flash objects. The final result has an improved professional and modern appearance, smaller file sizes and faster download speeds which have now been tested around the world (FutureVision, 2008).

Best Practice: Item 20

The 20th best practice regards the importance that these Web sites be usable for both novice and advanced Internet users. Thirty-two respondents agreed. One strongly disagreed and two had no opinion. Two indicated that this is almost always true. One wrote that it is an ideal. This result indicates that the developers believe their sites can and should be accessed by people with little Internet experience. This is important because it is not guaranteed that health workers in low-income countries will be advanced Internet users. In 2006, Ajuwon and Rhine distributed a questionnaire on Internet access and ICT training for health workers in sub-Saharan Africa, the results of which were presented at the 10th Association of Health Information and Libraries (AHILA) Congress, in Mombassa, Kenya in October 2006 (World Health Organization, 2006b). They reported the following results and conclusions: 1) “HINARI was generally under-utilized; innovative strategies are required to encourage more professionals to use this resource”; 2) “Self-taught method was the most commonly used means of acquiring ICT skills”; 3) “Respondents

expressed interest in training for many of the suggested ‘ICTs and information skills topics;’ ”

4) “There is need for continued education to update health workers knowledge and skills in use of ICTs;” 5) “There is need for further studies on why HINARI resources are under-utilized” (Ajuwon and Rhine, 2008).

Part VIII: Items Not Best Practices

Item 13

This item concerns which types of health workers these Web sites should be designed to be useful to. Respondents were allowed to choose more than one answer. The most common answer was workers at primary care health centers (clinics) (77.1 percent), followed by workers at primary care health centers (clinics) (74.3 percent), workers at ministries of health (71.4 percent), workers at regional hospitals (68.6 percent), workers at tertiary care or referral hospitals (60 percent) and consumers/patients (48.6 percent).

Other responses, from open-ended comments, include researchers, health managers, medical teaching, health journalists, students, international development organizations, people with disabilities, disabled people’s organisations, policy makers, community-based workers, workers for local NGO, advocates and educational institutions in the health care field. Several respondents stated that answers vary by site.

To what degree should health care professionals in low-income countries rely on the Internet and other information and communication technologies (ICT)? The three key areas of Internet use are management, monitoring and delivery of health services (Nabwowe, 2007). This approach has gained momentum at GK3, the Third Global Knowledge Conference, in Kuala Lumpur, Malaysia, in December 2007 (Global Knowledge Partnership, 2007). Not only can ICT be used to improve health care. It also can be used to achieve the United Nations Millennium

Development Goals, which include ending poverty and hunger, child health, maternal health, combat HIV/AIDS, environmental sustainability and gender equity, plus two goals not related to health care. At a GK3 workshop called Health Outcomes: The Role of ICT Applications, Standards and Practices, Chris Seebregts, manager of the Biomedical Informatics Research Division, Medical Research Council of South Africa, called e-health “an opportunity for routine health informatics and health care monitoring” (Nabwowe). Seebregts sees a “convergence between informatics and telemedicine.” In one project, Seebregts “collected data from paper records using hand held-computers to implement a sustainable e-health information system. The data was integrated into an electronic patient recording system.” Seebregts also promoted the use of mobile phones so that patients in remote areas can self-diagnose and report data back to health workers. These phones also were used for HIV counseling. “This is better than going to the health centre, sitting on a bench waiting the whole day for a doctor,” Seebregts said (Nabwowe).

Item 14

This item concerns which professions the health workers who view these sites are in. Respondents were allowed to choose more than one. The most common response is health trainers (68.6 percent), followed by medical doctors, nurses and health communicators (65.7 percent), midwives (62.9 percent), librarians and researchers (60 percent), policy makers (57.1 percent), health learning material producers (54.3 percent), epidemiologists (48.6 percent), journal publishers and technologists (31.4 percent) and anthropologists (14.3 percent). Given an opportunity to add other professions, respondents chose a variety from in and out of the health care profession: dentists, economists, community members and funders. Because indigenous people are unlikely to embrace the Internet right away — nor do they have the resources to do so — it is imperative that non-governmental organizations and intergovernmental organizations in

low-income countries take the lead in introducing information and communication technologies (ICT) there, particularly in the rural areas of those countries. That means the people who are targeted by these sites — from anthropologists to health communicators to librarians — should take the lead in using the Internet in the presence of their clients and introduce them to the technology. In turn, the Web developers should give them appropriate sites to view. Writing in 1998, Richardson states that while “less privileged farmers and food-insecure residents of rural communities” should not be expected to embrace ICT, “intermediaries in developing countries such as NGO should embrace them with the goal that their efforts would “improve their work, improve communication capacity, gain efficiencies and reduce telecommunication costs” (Richardson, 1998).

CHAPTER FIVE: DISCUSSION

*“A photograph has only one language
and is destined potentially for all.”
— Susan Sontag*

Part I: Impact of Survey Results on Theory

In this chapter I will discuss how the survey results impact theory, particularly health communication theory. Much has been written about health communication and health promotion theory. Several such theories are mentioned in the Literature Review herein. The vast majority of data related to health communication regards how health care professionals promote or communicate information to patients, clients and consumers. For example, three theories related to communicating information to patients are the precaution adoption process model, the elaboration likelihood model of persuasion and the authoritative parenting model. The precaution adoption process model tells us that people take different precautions against unhealthy behavior at different stages in their lives. (Weinstein and Sandman, 2002, p. 16-17). Proponents of the elaboration likelihood model of persuasion believe that decisions are led by attitudes and that persuasion is the basis for attitudes (Universiteit Twente, 2003). The authoritative parenting model tells us that parents who are both responsive to their children’s needs and “demanding of their behaviors” are considered authoritative (Simons-Morton and Hartos, 2002).

Meanwhile, there is less research available regarding how health care professionals can promote or communicate information to other health professionals. The study of communicating information between health care professionals — a business-to-business transaction — has increased in importance in recent years due to the emergence of the Internet and its World Wide Web. The Web is a dynamic

communication tool, with new information appearing on it daily; and the ways to convey information on it are constantly changing. Thus it is critical to study how health care information is communicated digitally from one health care professional to another. Add low-income countries to the equation — as the homes of targeted health workers — and this topic becomes even more critical and the need to conduct primary research in this field becomes even more apparent. There is a need for primary research about the attitudes of Web developers in developed countries toward best practices when building sites to be viewed by health workers in low-income countries.

Survey Preparation

The Web is an ideal place to publish health information. It is critical that health care professionals and their patients always have access to it. But little research exists about the relationship between health care and Web design. The primary research herein is a survey of 35 Web developers. The contents of the 23-item questionnaire were derived from an extensive literature review that includes research on health communication and Web design. It resulted in a discovery about communication theory that this researcher calls the digital research cycle. The core principle or thesis of the digital research cycle is that any successful communication of a computer-mediated message in the information age is a behavior which is influenced by the sender and receiver's attitudes and knowledge about textual style, the audience, the technology or distribution method and the subject matter to which the message pertains. For Web developers to successfully provide information to health workers in low-income countries, they must provide quality content, be culturally sensitive and be sensitive to the technological constraints of their target audience.

Results of the survey herein can help Web developers learn how they view their options when building Web sites for health workers. They also can help anyone learn how attitudes toward Web design change various theories of communication, especially health information theories. Web

developers have varying levels of skills, from basic Web design to advanced programming. And yet they are a homogenous group, because many fewer people build Web sites than view them. The 35 respondents to this survey are an even more homogenous group than Web developers in general. They are specialized. They build sites to be viewed by health workers in low-income countries. Their responses are crucial to understanding the attitudes of Web developers in their field.

Many things affect Web developers' attitudes. In addition to health communication and Web design, the literature review herein focuses on the elements of the digital research cycle, a new way to conduct multidisciplinary research. In this case the research was designed to help write the survey. The subject matter of this research is health care. The audience is health workers in low-income countries who participate in intercultural communication with Web developers. The technology or distribution method in which the health information exists is the World Wide Web, through which researchers may study human-computer interaction. The textual style is technical communication (medical). Review of the literature was followed by distribution of the survey, which brings the various subjects mentioned above together in one study.

In Agreement with Best Practices

A primary purpose of this dissertation is to explore the relationship between Web developers — who build sites that are designed for viewing by health workers in low-income countries — and their audience, those specific health workers. This was done by surveying the Web developers to ascertain their attitudes about — and knowledge of — best practices in their field that lead to their behavior, which is the building and maintaining of the sites. The results of this survey indicate that Web developers who build sites for health workers in low-income countries agree with best practices derived from theory in health communication and Web design. They believe in providing quality content. They believe in providing opportunities for feedback. They want to expand, not contract, their sites'

viewership. They have more than one target audience and they want people in low-income countries to be able to view health care sites on old computers.

Barriers to Transcultural Communication

All 35 respondents described their occupation/background. Twelve are Web developers with no medical background. Five are health care professionals with Web design experience. Five are Web developers with a medical background. One is a health care professional with no Web design experience. Twelve cited Other, including: a librarian, “a web manager with 20 plus years’ experience in the field of family planning and reproductive health,” “a librarian with web experience,” a “librarian with tech skills,” a “Web manager with no medical background,” a “medical librarian who heads an NGO that specializes in the area of Medical Information,” a secretary, a “medical librarian - web-site manager and content provider,” “an experienced medical publisher with no medical training,” a “Web developer with no formal medical background,” a “web site owner who is not a trained medic. However, I’m a scientist who has answered clinical questions for 10+ years,” and an “E-learning manager at the UN FAO.”

Thirty-four (of 35 total) respondents listed the country in which they are based. They are from: the United States (11), the United Kingdom (six), India (three), Switzerland (three), South Africa (three), Italy (two) and one each from Canada, Croatia, Germany, Kenya, the Netherlands and the Philippines. The respondents agreed or strongly agreed with 17 of 18 best practices — the lone opposition was to a best practice of requiring Web site registration.

The business-to-business relationship between the sender and the receiver — the Web developer and the health worker — is complex. Results of the survey show that the Web developer sometimes acts in the best interest of the health worker and sometimes he acts in his own best interest. Once published, the Web site becomes the vehicle — or distribution method — for transcultural communication between

these two entities. Luckmann denotes seven barriers to successful transcultural communication between health care professionals and seven variables that “may affect the attitudes and performance (behavior) of health care professionals from different cultures” (Luckmann, 2000, p. 261). These barriers, which are difficult to overcome in the world of face-to-face communication, can become tremendous obstacles to the successful implementation of some of the best practices for Web design promoted herein. One of the barriers that Luckmann says restricts successful transcultural communication is the “different cultural patterns and biases that affect the relationships between health care professionals” (p. 261).

What are the barriers that restrict successful transcultural communication between Web developers and health workers? How do the survey results change our thoughts about how cultural patterns and biases affect the relationship between Web developers and health workers? While the survey questions did not specifically address these issues, the respondents’ comments indirectly addressed them. Cultural patterns and biases may manifest themselves in many ways in Web development. But the respondents’ answers generally indicate a belief that cultural patterns and biases are not apparent in their sites. According to Luckmann (p. 262) male physicians in the Middle East consider women as subservient. There are several ways for this phenomenon to manifest itself online. Do male physicians in the Middle East feel the same way about female Web developers, whose names, photographs and contact information are likely to be shown on these Web sites? Assuming this is also true of male Web developers from the Middle East, a male, Arab Web developer may create a Web site in which the content is sexist, or one in which the site’s overt or covert tone is culturally anti-woman. They may find subtle ways to demean women, such as using male pronouns when referring to health workers of both genders. They may use photographs or drawings in which the health workers are always men and the patients are always women. They may use condescending language, particularly in feedback forms, where the Web developer should write in a more neutral tone. Finally, the Web

developer may feel that the respondent's opinion is not important. This position could be the male Web developer's belief if he allows cultural patterns or biases to affect how he builds Web sites.

In item No. 9, the respondents are asked whether it is important that these Web sites include a mechanism for providing feedback, such as a Contact Us page with an e-mail link back to the site manager. Twenty-two respondents (62.9 percent) strongly agreed, 12 (34.3 percent) agreed and one had no opinion. One stated that feedback is an important element of all Web sites. Another stated that the site manager is not the only person who should view the feedback. "What about the Technical Officer?" Another stated that a form would be useful. From these results one can conclude that Web developers overwhelmingly believe that feedback is an important factor in successful transcultural communication with health workers. With 34 of 35 respondents agreeing that feedback is important, one can conclude that cultural patterns and biases — reflected by the location where a Web developer is based — do not influence a Web developer's opinion about feedback as a tool for successful transcultural communication. From the Web developer's perspective, cultural patterns and biases do not reduce the importance of feedback; cultural patterns and biases are not a barrier to successful transcultural communication through feedback. Thus this survey result does conflict with Luckmann's notion that "different cultural patterns and biases that affect the relationships between health care professionals" are major barriers (p. 261).

The respondents were asked whether information on these Web sites should be written in such a way that the target audience understands it completely. More than 94 percent agreed or strongly agreed. Two had no opinion. Through their comments, respondents did not show any indication that cultural patterns or biases played any role in their answers. One stated that writing a Web site so that a target audience understands it completely would be "Tricky to achieve to a global audience!" Another said that "This is true of all websites," meaning that culture plays no role. Another said, "To the extent possible."

One respondent wrote that, “Members of audiences have different knowledge levels, needs and learning styles so I would never expect to write something that a collective group would understand ‘completely.’ There is too much variation in an audience for one size fits all.” This respondent likely is not basing the design of his or her Web site on least-common denominators, design choices that appeal to as many knowledge levels, learning styles and needs as possible. Learning styles are the different ways different people learn. They are partially based on culture. In Africa, where there are 6,000 people for every one computer, learning styles are different than in the West, because Africans have less computer experience. People in low-income countries would benefit from basic content presentation on a site they are using because they already have a steep learning curve adapting to the new technology. Another respondent stated that a translation option is important. This respondent recognizes that although English is the official language of Uganda, for example, it is not that country’s native language. Presenting a Web site in both English and Lugandan — or English and Ruchiga — may be necessary. Two respondents wrote that complete understanding would be difficult to achieve with an international audience. The Web sites to which they are referring are typically sites dedicated to a body part (eyes) or disease (malaria), and they are designed for health workers from many cultures. Some sites, such as that of the International Development Research Centre (idrc.ca), include multiple translations. IDRC includes content in both French and English. Efforts to translate a site from English to another major language are expensive and time consuming. Efforts to translate from English to a less common language would be more so. But technology is making that goal more realistic as more companies are inventing “automatic machine language translators.” Leng and Tanvejsilp (2008) call the Internet “a treasure trove of information that can be very useful for development efforts in Asia Pacific.” But they lament the fact that much of it is published in English and therefore many people are disenfranchised. The authors cite several attempts “to develop native language capabilities in Asia Pacific.” Among them

is Malaysia's Murasu Communications (M) Sdn. Bhd. This company develops software that enables text messages to be sent and received in the Tamil language. Another effort is in Cambodia, where iWOW Communications Pte. Ltd., created "a system for keying in and reading Khmer characters for sending and receiving short message service (SMS) text. In other examples: text messages are being translated to Korean Hangul and sent across borders; Pock Translate translates English SMS text into the Thai language "to help visitors to Thailand communicate with the local people;" and Microimage of Sri Lanka, created multilingual (Sinhala, Tamil, Telugu, Malayalam and Thaana) SMS software for mobile phones, for which it won the "prestigious" GSMA Asia Mobile Innovation Award for 2006 (Leng and Tanvejsilp, 2008). The DermIS site (Dermatology Information System, 2008) is offered to readers in English, French, German, Portuguese, Spanish and Turkish. Efforts such as these increase the possibility of successful transcultural communication between Web developers and health workers that the respondents agree is important. Finally, the fact that so many professions are mentioned by the Web developers as being among their target audience, as reflected by Table 15 and Table 16 in the Data Analysis chapter — and the fact that they want their sites to be understood completely — shows that the developers believe their content is not beyond the comprehension of their users. Respondents were asked whether it is important that these Web sites carefully consider prior feedback from users when updating the sites' textual content. More than 91 percent agreed. None disagreed. One respondent wrote that this is true of all Web sites. Is feedback an important part of a Web developer's efforts to diminish barriers that restrict successful transcultural communication with health workers? The results indicate that Web developers use feedback as part of their design arsenal. Most Essential Health sites encourage feedback, for both health care and technical reasons. One tells readers to "Contact Technical Support" (DermLectures.com, 2009). Another offers both technical and editorial support (emedicine.com). Another encourages readers to "Ask a Question" (Healthwise, 2008). The survey results and

accompanying visual evidence — the preponderance of Essential Health sites that encourage feedback — indicate that Web developers do not allow their cultural patterns and biases to prevent them from seeking feedback from their users.

The respondents were asked whether it is important that the target audiences of these Web sites be clear to the sites' users. Seventy-six percent agreed, while 22.9 percent had no opinion. Two respondents called this item confusing. What is meant is “Do you as a Web developer agree that it is important that users of your site know whether your site was designed for them?” This question is important. Web developers need to know who their audience is. Knowing this will help them design their site so that their audience can instantly recognize whether it is what they need. Knowing one's audience is crucial to breaking down barriers to successful transcultural communication. When an organization seeks a niche audience, building a general-purpose site is the wrong approach. Niche audiences want their information up front, not locatable via click-throughs. Another factor is the speed of computers and the Internet in low-income countries. Until these countries have bandwidth comparable to the West, and pages load faster, their users will exhibit usage patterns similar to those used by the West in the 1990s. Despite the fact that users are online longer now than in the past — in most countries — developers need to realize that some cultures are populated with people who have short attention spans and that they need to catch the reader's attention quickly. Users in low-income countries need to feel a bond with the developer, who is likely to be Western. It is the developer's responsibility to create that bond. One respondent was adamant that “We can't worry about everyone.” This respondent added, “I don't need to have big links on my home page that say ‘DOCTORS CLICK HERE’ or ‘PATIENTS CLICK HERE’ or ‘JOURNALISTS CLICK HERE’. We write for our target audiences -- plural -- and everyone else will figure it out, if they really want it. We can't worry about

everyone.” This response underlines the importance of a clear About Us page. Eisenberg (2006) says “To buy, customers must hear about themselves and what you can do for them.”

Customers are egocentric. They have their own needs, their own problems and their own goals. No one ever visited a Web site not hoping to benefit in some way from the experience, even if only incrementally or subconsciously. The fact that almost 23 percent of the respondents offered no opinion is troubling in that either the item was written poorly or nearly one-fourth of the respondents do not care whether the target audiences of these Web sites is clear to the sites’ users.

The Essential Health Links sites were built for use by people in a variety of professions, as well as a variety of people in the health care profession. Like the Web developer, each has attitudes and behaviors based on cultural patterns and exhibits biases based on them as well. Tables 15 and 16 in the Data Analysis chapter reflect the Web developer’s intended audience. The makeup of this audience tells us that the cultural patterns and biases of Web developers do not prevent them from attempting to attract a varied audience — from anthropologists to policy makers. That so many respondents stated that their target audience includes people from more than one profession says the sites they built are not exclusively niche sites. That distinction changes how one evaluates the sites.

Respondents were asked whether it is important that these Web sites carefully consider feedback from users when updating the sites’ graphical content. More than 82 percent of respondents agreed; three respondents disagreed (one strongly). The editing of images is controversial in times of war, as when the Bush Administration refused to allow images of caskets containing dead American soldiers to be shown during the Iraq War. Sontag (2003) wrote that:

Awareness of the suffering that accumulates in a select number of wars happening elsewhere is something constructed. Principally in the form that is registered by cameras, it flares up, is shared by many people, and fades from view. In contrast to a written account, —

which, depending on the complexity of thought, reference and vocabulary, is pitched at a larger or smaller readership — a photograph has only one language and is destined potentially for all (Sontag, p. 20).

The archival capacity of the Web prevents images from fading from view. One could use a search engine to find an iconic image — in seconds — that might take days to find using hardcopy archival techniques. Easy access is often a positive aspect of the Internet. But if an image is offensive, easy access could be a barrier to successful transcultural communication, such as when one posts a swastika on her Web site. Such cases could be resolved by feedback. For example, a developer posts an image on her site — such as a swastika — not knowing that it is offensive to a large group of people. A reader sends e-mail feedback explaining the offensive nature of the graphic and the developer removes the graphic. Another example would be the developer posting a text-laden image that is so small that visually impaired users cannot read the text. A user contacts the developer, explains the problem and the developer enlarges the image. The swastika, a symbol of Nazi German supremacy, is illegal in some European countries, albeit not in the United States. In some countries it carries religious significance. When developers allow users to comment about images and then the developers respond accordingly, they are removing barriers that restrict successful transcultural communication. These survey results indicate that developers appreciate input from users, even though one respondent wrote, “It may be ‘nice to have’ an opinion, but may not be really imperative. Professional designers with experience in such websites, are usually the best to plan the graphical content.” This is an unfortunate position considering Essential Health Links includes a category (Image Collections) with links to 11 sites, three of which are focused on low-income countries. Developers of these three sites — like developers of every other Essential Health Links site — should monitor the impact their images have on readers. Consider two Web sites about the same health care topic: DermIS and DermNet. It does not take long to find an image

on the DermIS site that may be offensive to some viewers. There is a drawing of the outlines of male and female adults on the homepage that shows a penis on the male. This is a medical site and thus it should not be offensive to a health worker. Or should it? Did the Web developer study the culture he is attempting to reach? Perhaps most people in a particular country are offended by nudity. Then perhaps health workers would be offended as well. In Uganda, men and women rarely wear short pants, because they prefer modesty. Ugandans are more likely than Americans to be offended by the penis image on the DermIS site. The developer should ask himself: Who is my audience? By contrast DermNet does not have potentially offensive images, but it does include an image link to a site where users can purchase pharmaceuticals. There may be nothing illegal about selling pharmaceuticals on a Web site, but the presence of the text link to the Pharmacy Direct Web site makes all medical claims on the site questionable. Readers should be cautious about sponsored Web sites.

Respondents were asked to rate the importance of creating sites that are usable to people for whom English is a second language. Ninety percent agreed. The most common comment was that this depends on the audience. That means in some cases it may be too expensive to produce sites in both English and a native language. These respondents believe that the health worker's primary language is a factor in whether a Web site is usable. While this is a practical position for the developer to take from a cost standpoint, it is not practical from the standpoint of one who wants to reach his audience. For example, one should not create a Web site about Uganda and not try to make it accessible for those who speak Lugandan or Ruchiga, two tribal languages, in addition to English. Simply put, too few people speak/read English well and only those who read English will view the site. One respondent noted the "cost implications" of making a site accessible through language. The cost of translation, which could be considered a financial pattern but not a cultural pattern or bias — is a barrier to successful transcultural communication.

Another barrier Luckmann says restricts successful transcultural communication is racism and prejudice. What are the barriers that restrict successful transcultural communication between Web developers and health workers? How can racism and prejudice undermine professional relationships between Web developers and health workers? The short answer is that racism and prejudice can undermine any communication. There is racism and prejudice in society as a whole. It exists in health care. It exists in transcultural communication. But does it exist in Web developers' attitudes toward best practices regarding their sites? Respondents were not asked this question directly. But their collective answers to the six items about audience and culture do not indicate that racism and prejudice play a role in the design of the sites. These respondents believe in offering feedback mechanisms and in using the feedback they receive. They want their audience to understand their content. They want the user to know who the target audience is. They want those in their audience for whom English is a second language to be able to use their sites. These are not the attitudes of a racist group. But the Web is a medium in which many source-country developers are Anglo — Western and white — and Christian and many target-country health workers are dark skinned and Muslim, so the possibility of racism exists.

Racism in low-income countries has its roots in the imperialist nature of countries such as Belgium, France, Portugal, Spain and the United Kingdom. Their presence as colonial powers bred deadly antagonism between races, even races from within the same country (Mamdani, 1984). An example is how Idi Amin Dada divided indigenous Ugandans from 'half-castes,' those born of interracial marriages and ran off business proprietors of Indian descent. Many Web sites require users to navigate in a nonlinear fashion by clicking on links related to demographic questions. It is possible for Web developers to divide users in a racist fashion through this mechanism. ("Click [here](#) if you are Muslim. Click [here](#) if you are Christian.") It also is possible for health workers in low-income countries

to use the content on a Web site as a tool for fostering racism between neighboring tribes in the same country.

Rajagopal and Bojin (2002) look at racism on the Internet. They argue that the World Wide Web is an ideal medium for promoting hate because it offers features that promote communication. Much like when American Civil Liberties Union attorneys represented Nazi sympathizers who wanted to march through Skokie, Ill., a predominantly Jewish town, it is ironic that some of the features of the Internet and the Web that promote openness — “flexibility, mass customization, allure, digitalization ... and the worldwide reach of unregulated freedom and access to information” (Rajagopal and Bojin) allow racist and prejudice Web designers to promote their beliefs as well. A November 2008 Yahoo! search for the phrase “White supremacy” generated 3.7 million results.

Looking at some of these features: Flexibility — In addition to the World Wide Web, the Internet has a number of features that offer “hate institutions such as the Ku Klux Klan” flexibility, including fire transfer protocol sites, mailing lists, Internet relay chat (IRC) channels and Yahoo! clubs (Rajagopal & Bojin). Mass customization — Web sites are easy and inexpensive to create, thus seemingly anyone with a hateful message can spread it on the Internet. Digitization — Virtually any two-dimensional textual, aural or visual message can be represented digitally on the Internet.

Anyone is capable of being a racist. Luckmann denotes three characteristics of health care professionals that “prevent individuals from openly confronting the racism that exists in their profession” (p. 262). Health workers are empathetic, individualistic and conflict avoiders. Empathy is a positive attribute, unless it masks prejudice. Web developers with medical backgrounds should remember to monitor the subtext of their messages on their sites to make certain that no underlying prejudice comes through. Likewise, individualism in health care is a positive trait: the doctor focuses on the patient in front of her. But when health workers ignore the cultural parameters of a particular society

when treating even one patient from that society, peril may ensue. Web developers with medical backgrounds also should consider the cultural differences of their audience. (That is a primary message of this dissertation.) One of the most important aspects of Web sites is stickiness. Do people visit a Web site often after the initial visit? Web sites that avoid conflict also avoid discussing important issues and may lose readers if they are seen as too bland, just as Web sites that foment conflict can scare users away. Either example is a form of potential prejudice because it discourages participation by a certain group of people, even within a medical Web site's niche audience or subgroup — such as new mothers or men with tuberculosis. Sometimes the innocent use of a word or phrase can mask an entire system of racism. For example, by using terms like cultural bias, cultural diversity and ethnocentrism, instead of “the politically incorrect term of racism” white health workers “deny its existence” (Luckmann, p. 263). This is possible in Web design and throughout academia. Denial is one of three health care racism scenarios presented by Luckmann. The others are aversive racism and color-blind perspective. Each can occur in Web design as well. Aversive racists are not aware that they are racists. They do not acknowledge their “negative feelings and beliefs” toward people of other races (Barbee, 1993, in Luckmann, 2000, p. 263). People react from a color-blind perspective when they do not consider race as a relevant “social category” (p. 263). Relationships are interpersonal, not intergroup. Race is not a topic for discussion.

A third barrier Luckmann says restricts successful transcultural communication is clashes in values between health care professionals in the North and the South. What are the barriers that restrict successful transcultural communication between Web developers and health workers? Can clashes in values arise between African health care workers and the Web developers trained in the West? Respondents' collective answers to the six items about audience and culture do not indicate a clash in values between Web developers and health workers. The fourth barrier Luckmann says restricts

transcultural communication in health care is “the different perceptions of responsibilities and client care that are based on different cultural values. Can these differences be transferred to the Web when Web developers and health workers communicate transculturally? Answers by responding Web developers and their open-ended comments generally do not indicate that different perceptions of responsibilities and client care that are based on different cultural values cause them poor transcultural communication with the health workers for whom they develop sites. But Web developers should be aware that such different perceptions could stymie communication.

Luckmann mentions three ways a health worker’s value system can be different from that of others: how they perceive their responsibilities to other people on a medical staff and the responsibilities of those people to them; how client care is perceived; and a different locus of control or control over their environment (p. 264). Each of these examples can occur in Web design. Regarding staff responsibilities: The Hofstedian concept of individualism vs. collectivism is relevant here. A Web developer from England may believe that a graphic artist from Kenya is inferior and thus assign him less important work than he assigns to a graphic artist from Canada. But the Kenyan will not mind because he is from a collectivist society, where group rights are more important than individual rights. But he still is being discriminated against. A Web developer/health worker from a ruling class in India may feel that his audience — health workers from a lower class there — are inferior, and thus publish content written in a condescending manner. However, favoring collectivism, even subconsciously, the “lower-class” Indian health workers may find the tone of the content to be appropriate. Regarding professional roles: A Filipino Web developer may privilege the role of a nurse over that of other health workers mentioned on a clinic site because of the Filipino “obligation to care” (p. 265). The importance that Filipino nurses place on their work can show in a Web site, but the highlighting of these nurses in a health care marketing tool such as a Web site may not be appreciated by a non-Filipino health worker.

Regarding locus of control: Like Western health care professionals, Western Web developers are likely to have an internal locus of control. They are likely to believe they are in control of their environment and that feeling likely will manifest itself in the design of a Web site. Conversely, people in low-income countries — including health workers — are more likely to have an external locus of control. They are likely to “have a more fatalistic attitude toward their clients, and thus feel that they cannot control matters of life and death” (p. 266).

The fifth barrier Luckmann says restricts transcultural communication in health care is differences in time orientation. What differences in time orientation do Web developers and health workers have? The respondents’ answers and comments indicate no differences in time orientation from the health workers who view their sites. As mentioned in Appendix J, time orientation is one of the five areas studied by Hofstede; five “fundamental culture dimensions” that affect behavior: power distance, individualism vs. collectivism, masculinity vs. femininity, uncertainty avoidance and long-term orientation (Hofstede, 2002). Long-term time orientation is a concept that represents a culture’s orientation to patience (Marcus, 2001, August 5-10). Asian countries score high on long-term orientation, indicating that society’s time perspective and an attitude of persevering (ClearlyCultural, 2008). According to Hofstede, cultures that score high on long-term orientation: emphasize persistence; order relationships by status and value personal adaptability. Desire to save face is common but seen as a weakness. They consider leisure time unimportant. They save, are thrifty; invest in real estate. They consider relationships and market position to be important. They think a situation or person is good or evil depending on the circumstances. Cultures that score low on long-term orientation: emphasize quick results; do not value status in relationships. They value personal steadfastness and stability. They value protection of one’s face. They spend; invest in mutual funds. They value the bottom line. They believe in absolutes about good and evil (Tidwell, 2008). Western Web developers are likely to have low long-

term time orientations. These developers will be driven by instantly derived Web site page-view statistics. They are more likely to post medical information online before it has been verified. They are not likely to privilege higher-status health workers or patients over those of a lower status. Nor will they value information from higher status individuals as more important than information from lower-status individuals. Their sites must remain profitable. Conversely, high long-term time oriented health workers from low-income countries emphasize persistence in treating patients and thus may be willing to try multiple treatments. They order relationships by status, and thus may not privilege medical advice that is given online by junior medical personnel or sites not online very long. They value personal adaptability, which may make following exact instructions difficult. Some of these examples are consistent with using best practices. Others are not. Hopefully, Web developers with medical backgrounds and health workers in low-income countries would not be overly generalizable and would have positive characteristics of both orientations.

The sixth barrier Luckmann says restricts transcultural communication in health care is different (conflicting) systems of health care and medical education. What conflicting systems of health care and medical education do Web developers and health workers have? The respondents' answers and comments indicate no conflicts. However, differences are possible. Just as the differences in how Western health workers and those in the South are educated affects communication between them, it also could affect communication between a Western Web developer with a medical background and a health worker from a developing country (p. 267). Health care in the United States focuses on theory while health care outside of the United States focuses more on the "development of clinical skills" and less on the "psychological needs of clients" (p. 267). Thus even though they may be encouraged by Web developers to use "therapeutic touch" with clients and though they may be encouraged to "engage clients in conversations that build trust and rapport" (p. 267), non-America health workers may be

reluctant to do so. Dealing with grief also is an important issue. Many non-Western health workers have not been taught how to handle patient grief, or lack thereof. This is a critical issue because of the prevalence of HIV and AIDS in low-income countries. The problem is not that the non-Western health workers do not assist grieving patients and family members. The problem is that Western Web developers may expect them to. Another transcultural issue involving medical education regards hands-on patient care. Were the Web developer and health worker trained to believe that the health worker or the family should provide the patient with his immediate health care needs? Filipino nurses may believe it is their duty to go to great lengths to provide care, and a Western Web developer may encourage that role, but another non-Western health worker may feel that it is the family's responsibility to provide much of the care. In low-income countries such as Uganda, it is not uncommon to see family members at a relative's side in a hospital, providing the basic needs of that patient. If a Ugandan woman has been exposed to care levels in Western hospitals, she may be upset when her father is in a Ugandan hospital and the nurses pay little attention to him. If a Western Web developer is not familiar with — or disagrees with — families providing health care in hospitals, transcultural communication could suffer as well.

The seventh barrier Luckmann says restricts transcultural communication in health care is language differences (p. 268). What language differences could exist between Web developers and health workers? The Web developers' answers indicate that they are based in 12 countries. Only two work in Africa (Kenya, South Africa). None work in Latin America, so among them there may be language differences with health workers from those two regions. The overall differences on language between the Web developers in the developed countries and the health workers in low-income countries could be vast. Jacobs, Agger-Gupta, Chen, Piotrowski and Hardt (2003) compiled an annotated bibliography of research on language barriers in health care settings. Two citations involved South

Africa. In one, Drennan (1996) found that interpreters were needed for 20 percent of patients and were available 69 percent of the time. In the other, Drennan and Swartz (2002) found that patients' primary language was not noted in a psychiatric hospital. Also, when language barriers occurred, doctors were more likely to consider patients symptomatic. Thirdly, "inadequate communication led to inadequate evaluation and diagnosis" (Drennan and Swartz). Finally, whether an interpreter was used was determined not by the patient's need but by the situation. Regarding language, people generally can be selfish. "English Only" is a cry in the United States; natives in Quebec promote "French Only" settings. Even in Uganda, where English is the national language, many Ugandans speak native dialects when conversing among themselves, rather than English. Many also speak native dialects when in the company of Westerners.

In a message from Colombian Jorge Maldonado, a senior physician, former Full Professor of Medicine at the Mayo Clinic, who has an interest in health information, to the HIFA2015 Web site, Maldonado says he "spent a sabbatical in France and know how attached they are to their language. Down here (Colombia) majority of people, including all health professionals, do not manage English well. Generally speaking, people need information (or knowledge if you will) in their native language (not everybody is Dutch the paradigm of multilinguality)" (Maldonado, 2008). Maldonado was replying (in English) to an e-mail from Justus Krabshuis, a Dutchman for whom English is his second language. On whether Health Sciences Online, an English-language Web site, is a good resource, Krabshuis wrote HIFA2015 that "As regards language — I am not so sure ... French scientists for example are far less inclined than Scandinavian or German scientists to learn English and I think they put themselves at a great disadvantage this way. There is even a ministry for francophony here in France." Krabshuis (2008) noted that the World Gastroenterology Organisation, with whom he is associated, publishes its guidelines in six languages (English, French, Spanish, Portuguese, Russian and Mandarin). "[A]nd you

know what ...more that 50% of all guideline visits go to non-english versions so I guess that is an answer of sorts ... I am just not sure what the question is” (Krabshuis, 2008).

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Fourteen of the 23 Likert Scale items in the questionnaire (Appendix B), which regard the respondents’ attitudes and knowledge of best practices related to content, audience and technology, also can be found in an analysis by Kim, Eng, Deering and Maxfield (1999) of 24 Web-based rating tools and five journal articles related to health care-oriented Web sites. (These sites rate health care sites in general, not those devoted to health workers in low-income countries.) The authors studied the 29 sources and found 165 distinct – but unidentified — criteria, from which 132 were grouped in 12 named categories (plus miscellaneous). As Table 29, shows, one or more of 14 dissertation questionnaire item topics are consistent with 11 of the 12 Kim categories. The nine dissertation questionnaire items not specifically represented by Kim’s categories can be placed in the authors’ Miscellany category. One Kim category not reflected in the questionnaire is user support. Based on this research, that omission is a limitation of the survey, which was limited to 23 items.

Table 29: Web Site Rating Categories

Kim Category	Scott Q Item
1 Content of site	1
2 Design and aesthetics	15
3 Disclosure of authors	22-23
4 Currency of information	5
5 Authority of source	2
6 Ease of use	16, 18-20
7 Accessibility and availability	17-20
8 Links	2
9 Attribution and documentation	2
10 Intended audience	12
11 Contact addresses or feedback mechanism	9, 11, 15
12 User support	—
13 Miscellaneous	3-4, 6-8, 10, 13-14, 21

Below is a discussion for why each questionnaire item belongs in each category and how the respondents' answers to the questions change how we think about Web design in health care. It is important to remember that these categories relate to health care in general, not health care in low-income countries.

Content of Site

Content of site (including “quality, reliability, accuracy, scope, depth”) is the first category. This category accounts for 30 of the 165 criteria (18 percent). Content is one of the four focal points of this

research (audience or cultural sensitivity, technology and textual style are the others). While the first eight questionnaire items regard content, item No. 1 in the survey deals specifically with the accuracy of content. More than 73 percent of the respondents agreed with the statement, “It is important that the Web sites linked off Essential Health Links — such as mine — include a link to some sort of verification that the site contains accurate content.”

Design and Aesthetics

Design and aesthetics (including “layout, interactivity, presentation, appeal, graphics, use of media”) is the second category. This category accounts for 22 of the 165 criteria (13 percent). Item No. 15 relates to graphics. More than 82 percent of respondents agree with the statement, “It is important that these Web sites carefully consider feedback from users when updating the sites’ graphical content.” One respondent commented, “Professional designers with experience in such websites, are usually the best to plan the graphical content.”

Disclosure of authors, sponsors, developers (including “identification of purpose, nature of organization, sources of support, authorship, origin”) is the third category. This category accounts for 20 of the 165 criteria (12 percent). Items 22-23 relate to disclosure, albeit generally. Respondents were asked in what country they are based and whether they are a Web developer with medical experience or a health worker with Web design experience. These items do not address all of the facets of the third category, and could not, due to length limitations of the survey, but they do give readers a general idea of the respondents’ occupational and geographical circumstances.

Currency of Information

Currency of information (“including frequency of update, freshness, maintenance of site”) is the fourth category. This category accounts for 14 of the 165 criteria (8 percent). Item No. 5 relates to currency. More than 91 percent of respondents agreed with the statement, “It is important that these Web

sites be updated on a regular basis.” Obviously some Web sites are updated more frequently than others. Online news sites such as nytimes.com, msnbc.com and cnn.com are updated more frequently than other news sites, such as those developed to complement print magazines. A number of American health sites say “Come here to get the latest in health news” but unless those sites focus on more than Western medicine, they will not be helpful to health workers in low-income countries. The goal of many of the Web sites linked off Essential Health Links is to be an information source about health care; either a body part (ophthalmology), an illness (malaria) or a region (sub-Saharan Africa). But constantly updating sites is difficult for several reasons. Many sites do not have the financial resources or manpower to be updated constantly. Furthermore, many of the topics of the sites linked off Essential Health Links are so specific that news does not happen often in their specific topical area. But when news does occur, it should be posted in a timely fashion on a site or sites that are about that specialty.

Authority of Source

Authority of source (including “reputation of source, credibility, trustworthiness) is the fifth category. This category accounts for 11 of the 165 criteria (7 percent). Item No. 2 relates to this statement. Item No. 2 also relates to the eighth and ninth categories. Links (including “quality of links, links to other sources”) is the eighth category. Attribution and documentation (including “presentation of clear references, balanced evidence”) is the ninth category. Each accounts for five (3 percent) of the 165 criteria. Results from item No. 2 indicate that more than 96 percent of respondents agree with the statement, “It is important that these Web sites identify or link to the sources of their content.” One of the strengths of the Web is a developer’s ability to link to source information. When a source is referenced, a user need not try to find it later. Rather he can link directly to that source, if it is online. The linking function of the Internet allows for quick attribution and documentation adds to the authority, credibility and trustworthiness of a site. However, the presence of too many links within a body of text is

not always a positive attribute. While this creates a nonlinear environment that some users may appreciate, there are several disadvantages: 1) A site with too many links in the body of text reminds one of a video game or pinball machine. With so many options, there are too many things happening on the screen at one time for the site to be effective. Its usability is diminished. 2) Linking to sites on other servers may be quick, but it may not be seamless. For example, if a Web developer's site is designed with frames, has a white background and *sans* serif fonts, and she links to a site without frames, a black background and serif fonts, the user will encounter difficulty going from the first site to the second one seamlessly. 3) Once the user becomes accustomed to the second site, he may stay there, and close the browser of the first developer's site. An appropriate way to approach link design might be to link from subscript within the text to numbered and labeled links at the bottom of each page. If this is done, the links will be small (subscript) and the user is encouraged to read the entire page of one server before clicking on links to go to another. Another disadvantage of multiple sourcing is the lack of control one has over whether a source he links to stays on that server indefinitely.

Ease of Use/Accessibility and Availability

Ease of use (including "usability, navigability and functionality") is the sixth category while accessibility and availability (including "ease of access, fee for access, stability") is the seventh category. Each category accounts for nine (5 percent) of the 165 criteria. Here there is some more overlap in functions. Item No. 16 relates to ease of use. Item No. 17 relates to accessibility and availability. Item Nos. 18-20 relate to both. Results of item No. 16 indicate that more than 90 percent of respondents agree with the statement, "It is important that these Web sites be usable by people for whom English is a second language. Language is a key element of the usability of a Web site. Results of item No. 17 indicate that more than 70 percent disagree with the statement, "It is important that these Web sites require registration." This is the only best practice proffered in the questionnaire to which the

respondents collectively disagreed. Registration reduces “ease of access,” but is nevertheless required by a number of sites across the Web. Registration can help the developer of a site collect information about its users, and/or it can reduce a user’s sense of privacy. Sometimes the subject of user registration can create irony, such as when this researcher clicked on a Poynter Online link to an Editor & Publisher Web site column about “alternatives to forced user registration” and the resulting column was only accessible after registration at the Editor & Publisher site.

Intended Audience

Intended audience (including “nature of intended users, appropriateness for intended users”) is the 10th category. Intended audience accounts for three (two percent) of the 165 criteria. Item No. 12 in the survey relates to intended audience. More than 77 percent of the respondents agreed with the statement, “It is important that the target audiences of these Web sites be clear to the sites’ users.” Users need clarity. Clarity begins with the name of the organization, which is, of course, not a function of the Web. But the organization’s name typically resembles the site’s domain name. When choosing a domain name it is easier to remember what not to do than what to do. Allbusiness.com, a Dun & Bradstreet company, lists the “Top 10 Mistakes Made When Choosing a Domain Name to Own” (Allbusiness.com, 2008). They include: “Being too close for comfort”; Settling for obscurity”; “Not making it easy to say”; “Making it too long”; “Paying too much money to be generic”; “Odd spelling”; “trying to fit a domain name to a business”; “Not doing thorough research”; “Dashes”; and “Picking a name out of frustration” (Allbusiness.com). Looking at each of these mistakes:

Being too close for comfort — Nonprofit organizations tend to be given names that represent the region where they work (i.e. International, National, World, American, British, African), the field that they specialize in (Medical, Health, Malaria, Eye) and a word that describes the unit (Agency, Association, Organization). They also tend to rely heavily on abbreviations (NCAA, FBI, NASA). Thus

it is very common for a customer to confuse two organizations. Such confusion can be mildly annoying if one is calling an organization on the telephone. When one finds out he has the wrong number, he hangs up and calls again. But on the Web when one accesses a site that he thinks is another, he may be inclined to stay at that site rather than seek out the one he was originally looking for. For example, three newspapers located within 50 miles of each other in southwest Florida have similar names: The Charlotte Sun-Herald; the Sarasota Herald-Tribune; and the Bradenton Herald. At one time the Bradenton Herald's Web site was called HeraldToday.com, which is similar to the Sarasota paper's Web site address, HeraldTribune.com. Customers frequently call or stop by each newspaper office thinking they are contacting the office of another. To combat this, the Charlotte Sun-Herald now refers to itself as the Charlotte Sun and the Bradenton Herald changed its Web site address from HeraldToday.com to Bradenton.com. The Sarasota Herald-Tribune made no such changes.

Settling for obscurity — The only suffixes that one should choose from are “.com”, “.org” or “.net.” The others will make a Web site's address so obscure that it will be hard to find or remember. The URL of the World Health Organization is who.int. The WHO would benefit from also owning who.com and who.org, to redirect traffic to who.int. WHO.com sends users to an entertainment site. WHO.org sends users to the World Health Organization.

Not making it easy to say — Some companies find it is best to name a Web site exactly the same as the name of the company. For example, the URL for the Stop TB Initiative, on the Essential Health Links site, is StopTB.org.

Making it too long — It is best to have a domain name that is one or two words long so users will be less likely to misspell it.

Paying too much money to be generic — Generic domain names were popular in the past. When the Web was new — and users were not sophisticated — URLs like news.com and health.com, were

appropriate. Another example is usability.gov, which is linked off Essential Health Links. Now marketers believe it is more appropriate to spend less money on a unique name and spend more money on marketing the unique name. Examples: Amazon, Ebay, Google and Yahoo! Because health care is a serious pursuit, professionals may be reluctant to use unique names. WebMD is an example of a unique medical domain. Examples of unique domains linked off Essential Health Links include: id21.org, infomine.ucr.edu and medscape.com.

Odd spelling — This is less likely to happen in the medical field than in other fields. None of the sites linked off Essential Health Links that developers design to be read by health workers in low-income countries have oddly spelled domains. Once someone hears a domain, he should be able to spell it.

Trying to fit a domain name to a business — Research the business sector and the domain name simultaneously because there will be fewer domains to choose from later in the process of establishing a business.

Not doing thorough research — Just as in 2008 whitehouse.gov is the president's site and whitehouse.org redirects to an anti-President Bush site, identical health-oriented domains with different suffixes could link to vastly different types of sites. It would be better to know in advance what other identically named sites are linked to.

Dashes — Including a dash in a long URL creates confusion, especially when the domain or the organization it represents is not well known. Very few of the sites linked off Essential Health Links include dashes in their domains. Below are examples of two sites that do use dashes:

Africa: South of the Sahara <http://www-sul.stanford.edu/depts/ssrg/africa/health.html>

GHI-Net <http://www.ghi-net.org/>

Picking a name out of frustration — Do not settle for a bad domain name.

Contact Addresses or Feedback Mechanism

Contact addresses or feedback mechanism (including “availability of contact information, contact address”) is the 11th category. Contact addresses account for two (one percent) of the 165 criteria. Item Nos. 9, No. 11 and No. 15 relate to contact addresses. More than 96 percent of the respondents agree with the statement, “It is important that these Web sites include a mechanism for providing feedback, such as a Contact Us page with an e-mail link back to the site manager.” More than 91 percent agree with the statement, “It is important that these Web sites carefully consider prior feedback from users when updating the sites’ textual content.” More than 78 percent agree with the statement, “It is important that these Web sites carefully consider feedback from users when updating the sites’ graphical content.” Feedback is one of the functions of the Internet that separate that medium from others. It should not be omitted or taken for granted.

User Support

User support is the 12th category. It accounts for two (one percent) of the 165 criteria. There is no matching item in the dissertation survey. Some 33 criteria (20 percent of 165) fall into the miscellaneous category, for which there is no exact equivalent in the survey.

Kim, Eng, Deering and Maxfield list the 29 Web-based rating tools and articles and the 12 categories but not the 165 criteria. Of those 29 Web-based rating tools and journal articles they cite, only a few are still accessible — by the Web site addresses listed in Kim — in 2008. One is Growthhouse.org (Asian AIDS resources), which also is linked off Essential Health Links, in the Gateways (Asia and Pacific) category. Growthhouse (2008) allows users to browse a list of 20 categories and search for information about them. The categories include: Hospice and home care; grief: general bereavement; grief: family settings; pregnancy loss and infant death; AIDS and HIV: general; AIDS and HIV: Asia Pacific; cancer; health resources: general; children dealing with death; death and dying guides; death

with dignity; elder care and seniors; estate planning; funeral planning; improving quality of care; pain management; palliative care; professional resources; suicide; and the San Francisco Bay area. Analysts rank each site relative to other sites in its class. As Table 30 shows, the Growthhouse criteria for inclusion has elements similar to the digital research cycle:

Table 30: Growthhouse and Digital Research Cycle Variables

Growthhouse	Digital Research Cycle
Content	Content
Geographic scope	Audience
Positive emotional tone	Textual style (The way the message is conveyed)
Technical design	Technology

Content (subject matter) — Growthhouse links to sites about life-threatening illness and issues related to death. Geographic scope — Most sites accessible through Growthhouse present information about the San Francisco, California, area, or they are regional, national or international in scope. Positive emotional tone — These sites are “life-affirming” and are beneficial to “to persons seeking emotional support” (Growthhouse, 2008). Technical design — Users can navigate Growthhouse-approved sites easily. These sites are typically not bandwidth-intensive (greater than 50 KB for text and images combined) which is important because many people in low-income countries have slow connections. “Skip the animated GIFs and get on with the content” (Growthhouse).

Another ratings tool Kim, Eng, Deering and Maxfield cite, which was still accessible in 2008, is HONCode. This tool has eight criteria. HON-accredited sites enumerate the authors’ qualifications. Information on these sites supplements the doctor-patient relationship; it does not replace it. These sites “respect the privacy and confidentiality of personal data submitted to the site by the visitor” (Health on the Net Foundation, 2008c). They attribute published material to the rightful author. Sites that make

claims back up the claims with facts. They list working e-mail contacts and have an “accessible presentation.” They identify sources of their funding and ensure that readers can distinguish between editorial content and advertisements.

Another of the 29 sources was Kittleson (1998), misattributed by Kim, Eng, Deering and Maxfield as Kotecki and Siegel. Kittleson wrote about the growing increase of health information on the World Wide Web during the latter years of the 20th century. He praises the existence of information but cautions against the proliferation of “scientifically accepted information” and criticizes use of the Web for disseminating “health misinformation” (Kittleson). In this regard, Kittleson and the survey respondents are of one accord. More than 73 percent of the respondents agreed with the statement, “It is important that the Web sites linked off Essential Health Links — such as mine — include a link to some sort of verification that the site contains accurate content.” However, one point Kittleson made in 1998 deserves scrutiny in 2008:

Content provided on WWW sites is rarely subjected to the same rigorous peer review procedure.

Without this established evaluative structure, determining the authenticity of printed information is shifted back to the professional and practitioner. Accordingly, users of Internet resources need to think more critically about networked information (Kittleson).

One of the survey respondents commented that verification of accuracy is not always possible.

Or, if we are the source of our own information, and possibly a sole or rare source of it, who is going to verify it? Furthermore, whose definition of “accurate” would you like? We deal with some controversial topics, and although we believe that we present the issues accurately, I assure you that many people feel differently (A comment by a survey respondent).

Working at approximately the same time as Kittleson, Biermann looked at approximately 400 health information Web sites and found that more than 33 percent “had not been subjected to peer review. And at least 6 percent of them contained wrong information” (Guernsey, 1999). A survey respondent asks an important question: “[W] hose definition of ‘accurate’ would you like?” The Web developer who aggregated the content believes it is accurate. The health worker or patient who reads the Web site believes it is accurate. Biermann studies how bone cancer is written about online and finds “the site of Encyclopaedia Britannica said the mortality rate is 95 percent. [Actually, it is 70-75 percent.] Such information could lead a parent away from worthwhile therapy, Biermann wrote. “The devastating effect these postings would have on vulnerable patients is incalculable,’ she added” (Guernsey).

Kittleson suggests one way to evaluate Web sites is to use a method similar to how librarians evaluate books. He suggests considering the scope, authority, currency, accuracy and purpose of a site. Scope equates to subject matter. Authority refers to the author and her credentials. Currency, as mentioned above, is the “frequency of update, freshness, maintenance of site” (Kim, Eng, Deering and Maxfield). Regarding accuracy, Kittleson asks: “Another concern is bias. Does the author have a political, ideological, or personal slant? Is this bias apparent or not? Consider if the information supporting the bias compromises the truth and validity of the facts presented” (Kittleson, 1998). Colosky (2001), citing Dombrowski (2000), asks about the technical communicator who may be presenting inaccurate information. He says there is no easy solution to problems related to ethics. Like all technical communicators, all medical writers “at some point in their career, will likely experience an ethical dilemma that no model with steps and questions can effectively resolve” (Colosky). Finally, Kittleson writes that, like librarians evaluate books, digital researchers should evaluate Web sites by looking at their purpose. More than 76 percent of the respondents agreed with the statement “It is important that the target audiences of these Web sites be clear to the sites’ users.” When they view a site, health workers

should ask themselves a variety of questions. ‘Is the Web developer trying to sell me a product? Is she trying to teach me something I do not know? Is she trying to influence me in any way?’ The answers to these questions will help health workers determine whether a site is biased. Perhaps Web developers should ask the same questions of their work and give careful consideration to their answers.

Larkin (1996), writing when the World Wide Web was new to the public, offered several questions consumers could ask when viewing health-oriented sites: “Who maintains the site? ... Is there an editorial board or another listing of the names and credentials of those responsible for preparing and reviewing the site’s contents? ... Does the site link to other sources of medical information? ... When was the site last updated? ... Are informative graphics and multimedia files available, such as video or audio clips? ... Does the site charge an access fee?”

Who maintains the site? Larkin states that academic and government-sponsored sites are more reliable than those sponsored by private organizations. However, there can be no doubt that the “marketing, social or political agendas” that he attributes to private organizations also can be promoted by grant-seeking academic institutions and power-seeking governmental entities. Is there an editorial board or another listing of the names and credentials of those responsible for preparing and reviewing the site’s contents? Some might say the About Us page is the most important page on a site because it outlines the authority with which the authors prepare the site’s content.

Does the site link to other sources of medical information? As mentioned above, questions such as this relate to item No. 2 (It is important that these Web sites identify or link to the sources of their content.) Larkin asks this question to point out the malpractice that a Web developer can commit by linking from his disreputable Web site to a reputable Web site such as that of the U.S. Food and Drug Administration. Anyone can make a site appear legitimate by linking to a legitimate site, because anyone can link to anyone without permission. Linking from site to site was a revolutionary concept in

the mid-1990s. In 2008, wrongdoers still can deceive users by linking to reputable sites.

When was the site last updated? More than 90 percent agreed with item No. 5 (It is important that these Web sites be updated on a regular basis.) One commenter stated that sites should be “[r]eviewed, not necessarily updated.” Another said updating frequency depends on “type of site.” Another agreed, stating: “I think this depends on the content and how often it needs to be updated.” Finally, a commenter said updating should be done “[e]specially for areas of medicine where things change often, such as HIV management.” The final comment is a point that could be made of sites viewed in any country in Africa.

The initial attempt to access the Intute rating tool — one of the 29 tools cited by Kim, Eng, Deering and Maxfield — by clicking on a URL labeled “Organizing Medical Networked Information” (OMNI), resulted in a Page Not Found prompt. However, the criteria used to select and evaluate sites linked off Essential Health is based on research by the Special Advisory Group on Evaluation for BIOME/OMNI, which is now known as Intute (Academy for Educational Development/SATELLIFE, 2008d). Intute is an online service that links to educational and research Web resources. Its free material “is evaluated and selected by a network of subject specialists to create the Intute database” (Intute, 2008a).

The foundation of the policies, priorities and criteria used to select and evaluate Intute online resources is the Intute Collection Development Framework and Policy (Intute, 2008a). Intute, one of the 29 evaluative resources cited by Kim, Eng, Deering and Maxfield, posts online a 28-page publication entitled “Health and Life Sciences Evaluation Guidelines” (Intute, 2008b). Not surprisingly, many of the criteria in this publication are similar to that of others mentioned in this chapter. Some of the criteria are specific to Intute. Among the questions asked:

“What is the intended subject scope of the resource and is it relevant to the Intute: HLS user

community?” (Intute, 2008b) — Scope refers to what a site intends to cover (Intute, 2008b), which is addressed by Item Nos. 7-8 in the questionnaire. Item No. 7 refers to the quality of the health care content on the site. More than 82 percent of the respondents (or 29) agree with the statement, “It is important that these Web sites contain high quality health care content.” More than 94 percent (or 32) agree with the statement “It is important that these Web sites maintain a tone best described as objective. So a large majority of the respondents want to produce high-quality, objective health care sites. That could be considered their scope. Another way of looking at this question is to look at the professions listed in item No. 14 and extrapolate what topics the developers might be intending to cover (by who they believe their audience to be). Medical doctors and nurses were mentioned as an audience by more than 65 percent of the respondents, but health communicators and librarians were both mentioned as an audience by at least 60 percent, so the scope of the material on these sites likely is broad enough to be understood by people with and without formal medical educations. The respondents to item No. 21 also address scope. More than 32 percent of respondents (or 11) state that their site is dedicated to a disease or syndrome (such as malaria); more than 14 percent of respondents (or five) said their site is dedicated to a geographic region (such as Africa) and 2.9 percent of respondents (or 1) states that their site is dedicated to a body part (such as the eyes).

“Who is the intended audience and does this affect the suitability of the resource for inclusion in Intute: HLS?” (Intute, 2008b) — Item Nos. 12, 13 and 14 address this issue. Scope is a word that seems to focus on the source but — if researched properly — the scope will be attractive to an audience. Regarding item No. 12, 27 respondents (more than 77 percent) agree with the statement, “It is important that the target audiences of these Web sites be clear to the sites’ users.” Eight respondents (almost 23 percent) had no opinion. No one disagreed. One of the six comments was, “One site might have more than one target audience, different content for different audiences but all contained within the same

site.” Another comment was, “In what way? I don’t need to have big links on my home page that say ‘DOCTORS CLICK HERE’ or ‘PATIENTS CLICK HERE’ or ‘JOURNALISTS CLICK HERE.’ We write for our target audiences -- plural -- and everyone else will figure it out, if they really want it. We can’t worry about everyone.” Intute is asking, “Who is your site’s audience? This respondent is saying, “I want my audience to find me.” Others are saying, “My site is large. It is for everyone. Site organization is not my problem.” But if the site’s scope is wide, the site organization problem can be daunting.

Regarding item No. 13: More than 77 percent of the survey respondents (or 27) state that their audience includes workers at primary health centers (clinics). More than 68 percent (or 24) state that their audience includes workers at regional hospitals. Sixty percent (or 21) state that their audience includes workers at tertiary care or referral hospitals. More than 71 percent (or 25) state that their audience includes workers at ministries of health. More than 74 percent of respondents (or 26) state that these sites should be designed to be useful to workers at international health organizations. More than 48 percent (or 17) state that their audience includes consumers/patients. More than 11 percent (or 4) are not sure. Open-ended responses include researchers, health managers, medical teaching, health journalists, students, international development organisations and people with disabilities and disabled people’s organisations. One respondent states that workers at primary health care centers probably would need information in local languages. “How about community-based workers, workers for local NGO, and Educational Institutions in the field of health care.” Three respondents indicate their audience varies by site, indicating they manage multiple sites. The final comment is, “Any one of these [listed] audiences is reasonable, a site doesn’t need to serve everyone.” On item No. 14, respondents were asked which types of health workers their sites were designed for and asked to choose from among a list of professionals. Respondents were given 13 choices (plus Not Sure and Other) and were allowed to choose more than

one answer. Ten different professions were chosen by at least 48 percent of the respondents. The five most frequent responses were: health trainer, 68.6 percent (or 24); health communicators, nurses and medical doctors, each 65.7 percent (or 23); and midwives, 62.9 percent (or 22).

Target audience is an important concept for Web sites to use to attract specific audiences but it is also a tool they can use to distinguish between audiences. For example, the Global Forum for Health Research (2008) meetings list, a page on a Web site linked off Essential Health Links that focuses on low-income countries, includes a space for users to list their meetings, and offers users the opportunity to specify the target audience for the meetings. For whatever reason, the target audience space on each of the sites listed in October 2008 is either “All” or left blank, indicating poor use of a valuable resource.

“Where has the information come from?” (Intute, 2008b) — As mentioned above, results from item No. 2 indicate that more than 96 percent of respondents (or 34) agree with the statement, “It is important that these Web sites identify or link to the sources of their content.” It is common for Web developers to say their sites offer “seamless” transitions or that their sites are “user friendly.” Often the owner of a site can mask the fact that a vendor’s software or database plays a major role in making his site dynamic. But information, the content that fills the database, must remain transparent.

“Is an organisation responsible for the information? Are any organisations associated with the resource, such as publishers, sponsors or funding agencies, reputable and recognised?” (Intute, 2008b) — The Intute authors are essentially stating that these organizations should be accountable for the words they write, the images they publish and the fact that they have linked to certain sites. They also are responsible or accountable for what they omit. Accountability is especially important for health-oriented Web sites, where omission of a step in a treatment process can be deadly. Sometimes accountability

increases credibility. The International Development Research Centre, a Canadian intergovernmental organization, has at least one site linked off Essential Health Links that focuses on low-income countries. It is a site dedicated to Volume 2 of *Designing and Conducting Health Systems Research Projects*, written by Varkevisser, Corlien, Pathmanathan and Brownlee and published by IDRC in 2003 (International Development Research Centre, 2008). The site is rich with resources. It is linked off the Health Research Resources category of Essential Health Links. Upon viewing this IDRC page, one can click on the site's homepage link, then the About Us link (2004), and learn that IDRC is an agency of the Canadian government. This knowledge should give the page more credibility in the user's mind. It tells the reader the Canadian government has "taken responsibility for the resource." The Canadian government is qualified to provide the information. Contact details are made available.

However, to say an organization sponsoring a medical site is qualified simply because it is a government site can be harmful. IDRC cannot verify every piece of data provided by outside sources for the IDRC Web site or IDRC publications. For that reason the Canadian government conducts a "special examination" of IDRC every five years. Every critical function of the organization's management — from its financial and management control to its information systems and management practices — is analyzed. The Auditor General's goal, as detailed on the site's Accountability page, is "to determine if its financial, human, and physical resources are managed economically and efficiently; and its operations are carried out effectively" (International Development Research Centre, 2006, July).

"Has an individual or group taken responsibility for the resource? Are they qualified to provide this information? Are contact details available?" (Intute, 2008b) — The vast majority of the sites provide contact information. These criteria are difficult to distinguish from the previous section. What is the difference between an "organisation" (mentioned above) and a group (mentioned here)? The

difference may be that an organization is a large, formal association of like-minded individuals who have a centralized hierarchy, and a group is smaller, less formal, less like-minded and decentralized. None of the sites linked off Essential Health Links are labeled as one person's site (excluding Dr. Fungus, which is a fictitious name). No others are titled "Dr Smith's AIDS page" like one might see among sites created by university professors. Most of the sites — such as the IDRC, the World Health Organization or the Library of Congress — were created by organizations. Doctor Fungus, a site about fungal infections (doctorfungus, 2008a) is the product of an editorial staff of nine people, (doctorfungus.com, 2008b) which could be considered a group. These content providers appear to be qualified. The staff includes five medical doctors, two people with Ph.D. degrees, one with a doctorate in pharmacology and one with a master's degree. The survey respondents do not address the size of their organizations, nor whether they consider themselves qualified to provide health information. Perhaps they assume themselves to be qualified.

"What is the provenance of the resource?" (Intute, 2008b) — Colleagues on three continents created the Doctor Fungus Web site in 1999. The extreme distance made "coordinating the development process" difficult and yet interesting enough that five collaborators wrote a conference paper entitled "Building a Medical Education Website: Lessons Learned From The DoctorFungus Website" (Rex, J.H., McGinnis, M., Arikan, S., Rodríguez-Adrián, L., Kirsch, M., 2001), which was presented at the 41st Interscience Conference on Antimicrobial Agents and Chemotherapy, Chicago, Ill., in December 2001. Meanwhile, on the site they ask for patience. "Please forgive errors of both omission and commission — we are writing and double-checking as fast as we can" (doctorfungus, 2008b).

"Is the information likely to be kept up-to-date?" (Intute, 2008b) — This question relates to item No. 5 on the questionnaire. More than 91 percent of respondents agreed with the statement, "It is

important that these Web sites be updated on a regular basis.” One of the key issues with updating sites is having the ability to update quickly and frequently. Unless they are updated, Web sites lose their relevance. Updating as often as necessary is the solution. An ideal method for understanding new media such as the Web is to “compare it to previous arts and literature as well as the competing conceptions of the future of this technology” (Saper, 1999). The publishing of information on the World Wide Web is analogous to the live performance of music, theater or stand-up comedy. Web sites, like live performances, are dynamic, changeable, fluid “events.” Ronald M. Dupont, a former Internet editor at Sunline, a world-renowned newspaper Web site, once remarked, “Our strength lies in our ability to see the potential in new ideas and then react quickly. We have a saying here that everything we do is set in Jell-O because it can change so quickly. We’ve learned to embrace Jell-O” (Scott, 2003). Both Web sites and televised live performances have the potential to accumulate millions of viewers (or page views). Live performers, who must react quickly to changing situations on stage, must also learn to “embrace Jell-O.” In both cases, the medium often is the message.

Indeed, in *Essential McLuhan*, he writes that this “is a world in which the creative imagination of the artist is now needed by the men who handle the computers” (McLuhan and Zingrone, 1995). Every industry needs an Elvis. Industries crave innovators who set high standards and garner attention for themselves and others in their craft. The music industry had Elvis Presley and the Beatles. The Web design and usability industries have Jakob Nielsen, called “The Guru of Web Page Usability” (Richtel, 1998) and “the king of usability” (Internet Magazine, 2002). When Nielsen attends usability conferences, young, entrepreneurial Web designers flock around him, asking questions about his career and his design techniques, fawning like hormonal schoolgirls, screaming, tearing at Presley’s clothes and wondering of him, “Are you lonesome tonight?” (Scott, 2003).

“Is the resource well known and/or heavily used?” “Does it have a print or electronic predecessor and how long has it been available?” “Are there any access restrictions?” (Intute, 2008b) — The survey does not address these issues. For a full list of “rating tools and journal articles with explicit criteria for evaluation of health related web sites,” see Kim, Eng, Deering and Maxfield (1999).

American Medical Association

Quality content is one of the primary concerns of the American Medical Association, which has published online its principles governing AMA Web sites. The AMA is focused on eliminating barriers that prevent the Internet from helping transform “the patient-physician relationship from that of physician authority ministering advice and treatment (with sometimes questionable patient understanding and adherence to recommendations) to that of shared decision making between patient and physician” (Winker et al., 2008). The AMA Web site lists five such barriers: Doctors have more access to information than do most patients; many patients do not understand the health information available on the Web; some online health information is of higher quality than other health information, due to the general variability of the content on the Web; many patients do not know when information they are being shown is influenced by commercial interests; and “uncertain preservation of personal privacy” (Winker et al.). Health workers in low-income countries, their supervisors and their patients should share these concerns. Analogizing the Web developer-health worker relationship to that of a doctor and a patient, a health worker in Uganda should have access to the same resources as the Western Web developer with a medical background. She should understand the health information given to her by the developer. She should be able to distinguish between high-quality and low-quality health information. She should recognize commercial influences on a site. Finally, the Web developer should be as keen to the importance of the privacy of patient information as the doctor, the health worker and the patient.

Due to its reach, i.e. the fact that every year more people who use the Internet use it to access information about health care, health care support and health care services, the Internet could change the way doctors and patients interact. But first the relationship between the source-country Web developer and the target-country health worker must be established. The majority of survey respondents agree with almost all of the best practices promoted in the survey. These best practices foster an open, thoughtful relationship between the Web developer and the health worker. This is the same type of relationship that health workers seek with patients, that health communicators seek with clients. The similarities are useful because research about the specific relationship between Web developers and health workers from low-income countries is sparse.

National Institutes of Health

Through their answers, respondents show that they agree with most of the best practices reflected by the survey choices. They also appear to agree with aspects of health communication, Web design and development communication theories upon which these best practices are based. Many organizations were researched to derive these best practices, from the very large World Health Organization to the nationally renowned (in Canada) International Development Research Centre to the very small Aaron Marcus and Associates (AMANDA) consulting firm in California. Academy for Educational Development/SATELLIFE seeks to ensure that the Essential Health Links sites meet a high standard of excellence. Another organization that relies on promoting best practices — to ensure that organizations build Web sites properly — is the National Institutes of Health. No sites linked off Essential Health Links — among those built for low-income countries that were in the initial survey population — use the NIH domain, dedicated to the National Institutes of Health. However, some of the best practices, promoted by NIH correlate with some of the best practices in the survey. To be built successfully for

NIH, Web sites must provide the proper answers to the following questions related to the content, cultural sensitivity and usability of their sites (National Institutes of Health, 2008):

Content

“What Federal laws, policies, and standards apply to NIH Web sites?” — No American laws, policies or standards apply to the foreign sites linked off Essential Health Links. However, the respondents do strive to reach various standards. More than 73 percent (or 25) of the respondents agree with the statement, “It is important that the Web sites linked off Essential Health Links — such as mine — include a link to some sort of verification that the site contains accurate content.”

“How will the site be maintained?” — According to the NIH, a “website should not be launched unless provisions have been made to update the content and ensure that the site is working properly. Websites require ongoing review and editing to keep posted information up-to-date, repair broken links, and respond to users’ requests. Maintenance tasks should be taken into consideration when the site is first proposed” (National Institutes of Health, 2008). Respondents agree with the need for authoritative (questionnaire item No. 1), sourced (item No. 2) and updated (item No. 5) content.

Cultural Sensitivity

Is an e-mail address required on an NIH site? — The NIH indeed requires an e-mail contact be listed for two reasons: 1) For users to report a problem on a site; and 2) Some wish to ask a follow-up question about something they read on the site. Respondents agree with the importance of giving users an option for contacting the Web developer. More than 96 percent (or 34) of the respondents agree with the statement, “It is important that these Web sites include a mechanism for providing feedback, such as a Contact Us page with an e-mail link back to the site manager.” As one respondent commented, “This is true of all websites.”

Usability

“What skills should be ... utilized when developing a website?” — The respondents address this issue with item No. 22 and item No. 23. More than 34 percent of respondents (or 12) refer to themselves as Web developers with no medical background. More than 14 percent of respondents (or five) refer to themselves as health care professionals with Web design experience. The same percent consider themselves Web developers with medical backgrounds. One respondent (2.9 percent) marked health care professional with no Web design experience. (That number is surprisingly low.) The NIH site also promotes using employees with multiple skills. Oddly, the NIH recommends a staff of at least 14 people to run a site. Not one of the job descriptions listed mentions that an employee should have a medical background.

“What design standards must be followed?” — The survey does not address design standards but respondents do agree that feedback about both the graphical content and textual content of their sites should be considered. More than 91 percent of respondents (or 32) agreed with the statement, “It is important that these Web sites carefully consider prior feedback from users when updating the sites’ textual content” in item No. 11. More than 82 percent of the respondents (or 29) agreed with the statement, “It is important that these Web sites carefully consider feedback from users when updating the sites’ graphical content.”

“Where should I host my site?” — There is no direct parallel between this question on the NIH site and any item on the questionnaire, but one of the employees the NIH recommends hiring is a server administrator who can monitor “site performance to ensure that the site can handle peak traffic.” Meanwhile, more than 76 percent of the respondents (or 26) agree with the statement in item No. 18: “It is important that these Web sites be accessible with a dialup modem” and more than 77 percent of the respondents (or 27) agree with the statement in item No. 19: “It is important that these Web sites load quickly, even if it means limiting graphics.” Three NIH questions were not covered by the

questionnaire: Is testing an NIH Web site required? How is an NIH Web site launched? How can information be collected about an NIH site?

CHAPTER SIX: CONCLUSION

“(Claude Shannon’s) discoveries were very much like Einstein’s, in the sense that Einstein was thinking about some things that no one else was and suddenly came out with not just the question but the answer, like $E=mc^2$.”
— David Neuhoff

Part I: Summary of Findings

In Part I of this chapter I will briefly discuss my hypotheses for this research, the approach I took and my ultimate goal. I will state what I expected to find, how the results changed my thoughts, and whether the hypotheses were ultimately proven or disproven. I also will discuss what I learned from conducting this research and the difficulties I had conducting it. In Part II, I will go into more detail about my hypotheses, my academic approach, what I expected to find, what I found and how that changed my thoughts on certain points. I also will discuss — in more detail — difficulties I encountered, how I resolved them and how the results caused me to revise my conclusion. In Part III I will discuss future research, including replication of some surveys discussed herein, not excluding the present study. I also will discuss ways the digital research cycle can be used to aid in academic research, marketing campaigns and Web design.

My null hypotheses in this dissertation are threefold: 1) There is no significant difference in Web developers’ attitudes toward meeting the customer’s need for high-quality content, and their attitudes toward meeting the cultural needs of their audience. 2) There is no significant difference in Web developers’ attitudes toward meeting the customer’s need for high-quality content, and their attitudes toward meeting the technological needs of their audience. 3) There is no significant difference in Web

developers' attitudes toward meeting the cultural needs of their audience, and their attitudes toward meeting the technological needs of their audience.

My alternative hypotheses in this dissertation is threefold: 1) There is a significant difference in Web developers' attitudes toward meeting the customer's need for high-quality content, and their attitudes toward meeting the cultural needs of their audience. 2) There is a significant difference in Web developers' attitudes toward meeting the customer's need for high-quality content, and their attitudes toward meeting the technological needs of their audience. 3) There is a significant difference in Web developers' attitudes toward meeting the cultural needs of their audience, and their attitudes toward meeting the technological needs of their audience.

My approach was to survey Web developers whose sites are designed for viewing by health workers in low-income countries, using a Likert Scale-style questionnaire. My goal was to conduct a statistical test on the means of their responses, gauging whether they strongly agree, agree, strongly disagree or disagree with the items, or have no opinion about them. These questionnaire items were grouped by whether they pertained to content, cultural differences or technology.

Using a 95 percent confidence interval, it was determined that there is no significant difference in Web developers' attitudes toward meeting the customer's need for high-quality content, and their attitudes toward meeting the cultural needs of their audience. However it was determined that there is a significant difference in Web developers' attitudes toward meeting the customer's need for high-quality content, and their attitudes toward meeting the technological needs of their audience. It also was determined that there is a significant difference in Web developers' attitudes toward meeting the cultural needs of their audience, and their attitudes toward meeting the technological needs of their audience.

From doing this research, I learned that many things. Among them, I learned that Web developers building sites for health workers in low-income countries do follow best practices, but there are some

gaps between the senders' ideas of best practices and the receivers' ideas of best practices. Not surprisingly, these differences are chiefly related to culture, as when Dr. Simon Okello declared the showing of body parts — even for scientific purposes — on the World Wide Web as being unacceptable in countries like Uganda where modesty is paramount. This could lead to conflict and would be an excellent avenue for future research, from heuristic evaluations to usability tests (Okello, 2008).

While doing this research I also learned the many ways that digital communication can be studied. Every communicative act has a sender and a receiver, a transmitter, a message and feedback. Because digital communication requires instantaneous transmission of recorded thoughts (as with instant messaging), there are many opportunities for future research. In such research, one could change the variable as often as desired. One could regularly change the subject matter, the textual style, the audience or the technology or distribution method and generate many different results using similar parameters. Recording or archiving the content is essential and conducting pre- and post-communication surveys is recommended.

I had difficulties conducting the research. First, response to my survey was low (n=35). Second, I attempted to survey all of the members of a population, not a random sample of the population. Third, this research began in 2003. Much can happen during a 5- or 6-year period in each of the disciplines I am studying. Fourth, I had a general lack of knowledge of — and little experience with — culture in Africa and other low-income regions. A fifth difficulty was the wording of some items on the questionnaire I wrote. Some respondents either expressed confusion or reacted negatively to several items.

Here is how I resolved these issues — or hope to. There is no way — retroactively — to enact measures to increase the response rate. I can only suggest that future research be conducted using different techniques to entice respondents. Because I discovered that I should have used a random

sample — rather than survey the entire population — after I conducted the survey, there is no way to correct that mistake without expanding the scope of the dissertation. However I can resolve that issue here, somewhat, by stressing that the respondents are part of a subset of the population, if not a random sample. Meanwhile I cannot change the fact that I worked on this dissertation for more than five years, but I believe the delay worked to my advantage and made my dissertation better. For example, I resolved my lack of cultural knowledge about low-income countries by taking two trips to Uganda, gathering information about East African culture over a total of five weeks. Completing the dissertation sooner would have meant excluding information gathered on those trips from this research. After the survey has been administered, I cannot resolve the fact that some respondents do not like the wording of some of the questions. (In one respect, this is a finding. In another respect, this is a difficulty.) However I can partially resolve the problem of the wording of some questionnaire items by proposing that future surveys be conducted with questionnaires rewritten to reflect user comments. Meanwhile, my revised conclusion is that Web developers do think differently about the technological needs of their audience than they think about providing high-quality content and about the cultural needs of their audience. Each of these issues mentioned above will be analyzed below.

Part II: Analysis of Findings

In this section I will go into more detail about my hypotheses, my academic approach, what I expected to find, what I found and how that changed my thoughts about certain points. I also will discuss — in more detail — difficulties I encountered, how I resolved them and how the results caused me to revise my conclusion.

The hypotheses mentioned above were based on a review of literature, an analysis of a sample of

the sites linked off Essential Health Links and discussions with Drs. Rhine and Pakenham-Walsh, administrators of the INASP Health Links and Essential Health Links gateway sites. The review was multidisciplinary. It included a look at public health informatics, medical writing, international technical communication and cross-cultural user-interface design, among other fields. It also included a look at the Health on the Net Foundation, which promotes “the effective and reliable use of the new technologies for telemedicine in health care around the world” (Health on the Net Foundation, 2008a) and other organizations that certify health information. Working with Nazim Uddin, Ph.D., in the University of Central Florida’s Department of Statistics and Actuarial Science, I used SPSS 16 Grad Pack software to conduct a univariate analysis of variance (the Tukey’s Honest Significant Differences [HSD] test) to determine whether to reject the hypotheses. (Data and results from this test are in Appendix G and Appendix H, respectively).

Web developers who build sites to be viewed by health workers in low-income countries were surveyed as to their attitudes and knowledge. Respondents answered 18 Likert Scale-type items. Eight questionnaire items were about the content or subject matter of these Web sites. Six were about cultural differences. Four were about technological differences. Each item corresponded with a best practice. Agreement on the item correlated with agreement with the best practice. It was found that the Web developers agree — by large majorities — with 17 best practices. They disagree with one. This researcher expected to find no significant difference between the Web developers’ collective attitudes on content, culture and technology. It was thought that when they build sites, Web developers will give equal weight or importance to best practices related to quality content, the cultural needs of their health-worker audience and technological needs of their audience, people who view the sites on the World Wide Web, a medium the Web developers chose. There was no literature found which grouped these three variables in surveys about health communication, Web design or low-income countries. Thus there

was no previous evidence to support the notion that Web developers treat one variable differently than the other two.

Using a 95 percent confidence interval, it was determined that there is no significant difference in Web developers' attitudes toward meeting the customer's need for high-quality content, and their attitudes toward meeting the cultural needs of their audience. However it was determined that there is a significant difference in Web developers' attitudes toward meeting the customer's need for high-quality content, and their attitudes toward meeting the technological needs of their audience. It also was determined that there is a significant difference in Web developers' attitudes toward meeting the cultural needs of their audience, and their attitudes toward meeting the technological needs of their audience.

As mentioned above, two of the three alternative hypotheses were supported by the results of the survey. Web developers do have similar attitudes toward meeting the customer's need for high-quality content, and meeting the cultural needs of their audience. But they do not have similar attitudes in two areas: they view technological needs differently than they view high-quality content and they view technological needs differently than they view cultural needs. For Web developers, consistent views on providing high quality content, adhering to a customer's cultural needs and how they view their customers' technological needs are positive attributes that will likely lead to success. Support of the two hypotheses — and an indifference to the audience's technological needs — may have resulted from a general malaise regarding usability issues, such as toward how their audience views their sites. It may, however, have resulted from the results of one technology item (No. 17 on the questionnaire). Nearly 73 percent of the respondents on item No. 17 (23 of 32) disagreed — or strongly disagreed — with the following best practice: “It is important that these Web sites require registration.” Two respondents agreed or strongly agreed. Seven had no opinion. This is the only item in the survey with which the

majority of respondents collectively disagreed, and thus it is the only best practice with which they disagreed. It is possible that their similar responses (disagreeing) on this item — on a survey with 18 Likert Scale items and 35 respondents — led to a low mean and impacted the overall result.

It was recognized after the survey was conducted that item No. 17, which states, “It is important that these Web sites require registration,” is not consistent verbally with item Nos. 18-20. This inconsistency may have skewed the results. Requiring registration does not ease a technological barrier. Many believe requiring registration increases a technological barrier. Thus to require registration is not a best practice. Item No. 17 should have been written, “It is important that these Web sites not require registration.” The point is not to make sure that the respondents answer a certain way, but rather to ensure that the respondents’ individual answers follow a consistent pattern on a Likert Scale. If respondents agree generally with items about reducing technological barriers, then all of their responses should be “Agree.” Such consistency helps the researcher conduct statistical tests on means of responses. For example, item No. 17 recommended a technological barrier and the respondents generally disagreed. Then they agreed with item Nos. 18-20, which proposed best practices that reduce barriers. The mean for item 17 is 3.90625, which falls very close to 4 (Disagree) on the Likert Scale. Eliminating item No. 17 from the survey makes the grouping of means for technological barriers more valid. With item 17, the combined mean for item Nos. 17-20 is 2.405764181. (Without item No. 17,) the combined mean for items No. 18-20 is 1.905602241. The latter mean is closer to Agree on the Likert Scale and is consistent with the overall purpose of the survey, which is to find out respondents’ attitudes about best practices.

One respondent stated that site “[r]egistration is a barrier, even if it is free. Another stated that “[r]egistration is a barrier to use. I can see requiring this before participating in online forums, but not just to look at information.” A third wrote that “[r]egistration is a barrier to consumption of information

(content) but does potentially provide benefits when trying to build communities.” At least one Ugandan health worker disagrees. When asked about cultural differences and the impact of easily viewed nude body parts on some Essential Health sites, Simon Okello, M.D., a Ugandan physician, declared that — to Ugandans — sites without registration are barriers to cultural sensitivity. “That is where the problem comes,” Okello says. “If they are built for us to learn on, then they should be specifically for us who have an interest in learning the [medical] area, not for everybody, because definitely there are some images and some information that might be cultural negative to us. If they need to design one [health care Web site], it should be made in a way that it is only accessible to them that have an interest in it, so that the other part of the population is kept away from it. I think it would be positive.” Thus while Web developers reject site registration for their users, a potential user desires it. Web developers must heed the cultural differences between themselves and health workers in low-income countries to prevent more discrepancies like this from happening in the future.

Results of each individual questionnaire item helped determine the group means. As stated in the Data Analysis chapter, respondents agree with the eight items related to content, including that sites linked off Essential Health Links should include a link to some sort of verification that they contain accurate content. They believe it is important that these Web sites identify or link to the sources of their content. They agree it is important that these Web sites include disclaimers, about confidentiality of data and patient rights, when appropriate. They believe it is important that these Web sites indicate when they were last updated. They agree it is important that these Web sites be updated on a regular basis. They believe it is important that the information on these Web sites help health workers make health care decisions. They agree it is important that these Web sites contain high quality health care content. They believe it is important that these Web sites maintain a tone best described as objective. As stated in the Data Analysis chapter, respondents agree with the six items related to cultural sensitivity and audience.

They agree it is important that these Web sites include a mechanism for providing feedback, such as a Contact Us page with an e-mail link back to the site manager. They believe information on these Web sites should be written in such a way that the target audience understands it completely. They agree it is important that these Web sites carefully consider prior feedback from users when updating the sites' textual content. They believe it is important that the target audiences of these Web sites be evident to the sites' users. They agree it is important that these Web sites carefully consider feedback from users when updating the sites' graphical content. They believe it is important that these Web sites be usable by people for whom English is a second language. As stated in the Data Analysis chapter, respondents agree with three of the four items related to technology. Respondents agree it is important that these Web sites be accessible with a dialup modem. They believe it is important that these Web sites load quickly, even if it means limiting graphics. They agree it is important that these Web sites be usable for both novice and advanced Internet users. However, as mentioned above, they do not believe it is important that these Web sites require registration. Respondents to the survey include health care professionals with Web design experience, health care professionals with no Web design experience, Web developers with medical backgrounds and Web developers with no medical background, among others. They are a homogenous group. They were surveyed because they belong to a population that builds sites that are linked off Essential Health Links, a gateway maintained by the Academy for Educational Development/SATELLIFE at healthnet.org. AED/SATELLIFE divides some 700 sites two ways: 1) Sites dedicated to developed countries and sites dedicated to low-income countries; 2) Sites offering general health resources, sites offering specific health resources, and sites offering library and publishing support. One-third of the respondents state that their sites are dedicated to diseases or syndromes. The remaining 67 percent give other responses. The survey results represent the views of a subset of the group of developers who built nearly 500 Web sites for low-income countries. These

results can be extrapolated to represent the views of many other Web developers who build sites — for health workers in low-income countries — that are not linked off Essential Health Links. Respondents are based in 12 countries: Canada, Croatia, Germany, India, Italy, Kenya, the Netherlands, the Philippines, South Africa, Switzerland, the United States and the United Kingdom.

The results of statistical tests above changed my thoughts about how Web developers approach technological differences. They indicate Web developers are more likely to provide high-quality content and meet the cultural needs of their customers than they are to meet the technological needs of their customers. One may ask how a developer requiring registration helps meet the technological needs of one's audience. When people are required to register at a site it gives them a sense that the content on the site is important, adding to the site's credibility. Registration also enables a user to more efficiently receive exclusive amenities offered by the Web site (behind the registration "wall") and it can keep some people from viewing certain material, which is preferred in some countries, such as Uganda, where modesty about showing bare skin can make registration for medical Web sites desirable.

This difference on technological needs is a result that can be emphasized when I publish the results. These findings can be useful to Web developers and health workers as they strive to work together to share health care information. Western source countries should transmit high-quality content — that is culturally sensitive — to low-income countries in the south and the east, using technology that is approved by both the sender and the receiver. In 2009, I will publish and promote a Web site that contains the results of this dissertation and includes best practices for both Web developers and health workers to consider. Conforming to the stated mission, the site will be developed based on questionnaire results regarding attitudes toward the 18 best practices of high-quality content, cultural sensitivity and the technological needs of an audience.

As mentioned above, there were a number of difficulties encountered while conducting this

research and the survey herein. One difficulty was the low response rate. Web developer contacts with posted e-mail addresses were contacted three times; contacts with HTML forms were contacted once. Some may argue that the sample size (n=35) is too small. There is no way to rationalize the small response, no way to justify saying, “The small response is OK, because ...” Surveys with higher response rates than the present study (11 percent) have more validity. However I believe research could be conducted in the future, using the same survey or a similar survey — revised to reflect lessons learned and respondent feedback. Perhaps after seeing the survey again in their e-mail, Web developers would be more inclined to complete it next time.

A second difficulty is how the respondents were chosen. This researcher attempted to survey the entire population of Web developers, rather than a random sample. When Rhine requested the survey in 2003, the purpose was to use the raw-number results to help Rhine and Pakenham-Walsh learn more about the attitudes of the Web developers who build the sites that were linked off INASP Health Links (now Essential Health Links). It was not until after the survey was conducted that I realized that in order for the hypotheses to be properly tested, a random sample of the population of Web developers must be given questionnaires, not all of them. However if one believes, as I do, that there is homophily (little difference) between a small subset of this population of Web developers and a random sample of the same population of Web developers, then one can overcome this difficulty and believe the findings above.

A third difficulty is the duration of the research. It began in 2003 and concluded in 2008. Content on the Internet and World Wide Web changes daily; technology for accessing and manipulating the Web changes almost as fast. It was believed during the 1990s that during one calendar year the Internet experienced the equivalent of four years of growth in other technologies, because technological advances were happening four times faster with online and other digital technologies than in other

business sectors. That level of growth could not be sustained forever, however, so that adage is probably not true today. However, it is true that books I read for a literature review in 2003 are not as relevant in 2008. In some cases, journals found online in 2003 and 2004 are no longer accessible online. That also is a limitation of this research. It is more difficult to take a snapshot of life on the Internet in 2009 than it is to take a snapshot of, for example, the history of computers, in 2009. Too much is happening too quickly and we do not have the benefit of history telling us which books and which online articles will be relevant in 2018. This lament, however, suggests a need for more research into the publishing of texts in digital formats. What are the implications of putting Shakespearean sonnets on a MP3 player, Palm Pilot or other personal digital assistant (PDA)? Does it give Shakespeare publishers a broader potential audience? Yes. Does it change a sonnet's meaning? Possibly? But digital technology has changed so quickly that in 2009 a better question might be, "What are the implications of putting Shakespeare on an iPod or iPhone? Moreover, in 2009 one need not read Claude Shannon's work in a hardcopy book. He can find a video about Shannon online at Youtube.com (2008), the narration on which states:

"His discoveries were very much like Einstein's, in the sense that Einstein was thinking about some things that no one else was and suddenly came out with not just the question but the answer, like $E=mc^2$," [David Neuhoff, of the University of Michigan, states in the video.] "That initiated all of the research on atomic energy; the fact that there is so much energy and this is how much there is. Shannon discovered these formulas about information transmission. How fast? How many bits per second one should be able to transmit over various media? Other people were not asking the question, and he came up this answer and it was just so beautiful that it inspired the people who ended up designing your cell phone and the communication links that make up the Internet" (Youtube, 2008).

Cultural differences between Web developers in the West and health workers in low-income African countries likely did not change much since 2003. However, during this time one can safely assume the health information content on the World Wide Web has been updated frequently, and added to, often. And there also have been many technological changes related to the Internet since this research began. Meanwhile, I believe there were some advantages in taking so long to complete the research. First, it enabled me to plan, take and write about two trips to Uganda, where I learned much about cultural differences between Americans and Africans. Second, it enabled Survey Monkey, a company formed in 1999, more time to refine its software before I used it in 2008.

A fourth difficulty was my lack of experience with the cultural needs of others. No amount of research in a library or online can equal taking a trip to the country one is studying. When I began this research I hoped to secure a Fulbright grant to visit Africa because I knew that gathering information on such a trip would increase my credibility. My resolution for this difficulty is noted in the paragraph above, and in more detail, below.

The fifth difficulty related to the wording of some questionnaire items. Some respondents indicated they did not understand or like several questions in the survey (Appendix B). One respondent did not understand item No. 2 (“It is important that these Web sites identify or link to the sources of their content.”). One found item No. 12 confusing. Another did not understand it. It read: “It is important that the target audiences of these Web sites be clear to the sites’ users.” One found Item No. 13 confusing. It read: “These Web sites should be designed to be useful to (You may choose one or more response):” One found item No. 14 confusing. It read: (The health workers who should view these Web sites are primarily from which profession (You may choose more than one):” Overall, the 35

respondents answered 793 of the 805 questionnaire items (23 items x 35 respondents = 805 responses) for a 98.5 percent response rate.

Now that the research has been completed, I cannot resolve all of these five issues. For some I can only offer explanations and propose future research so that similar difficulty will not occur in the future. The first difficulty to address is response rate. The response rate (n=35) was low. An extensive initial contact letter (Appendix C) and an extensive consent document (Appendix D) — both required by the University of Central Florida's Institutional Review Board — hampered the response rate (11.04 percent). Furthermore, I believe the survey herein should be part of a longitudinal study. It should be given again — at a later date — to the same group of Web developers — those who build Web sites dedicated to health workers in low-income countries that are linked off Essential Health Links. The survey (Appendix B) should be identical, to ensure validity and reliability. The audience (Appendix F) should be from an updated list of the same group of Essential Health Web developers. The IRB text should be updated to reflect time elapsed since the previous survey but otherwise should remain the same. Several elements should be done differently, however. The initial contact (Appendix C) and consent document (Appendix D) should be clickable Web pages rather than e-mail messages. This is because the blocks of text on these two documents (952 words and 587 words, respectively) are too long to be readable as e-mail.

After a second identical survey is conducted in the future, and the results are compared with the first survey, more research should be conducted, albeit under much different circumstances. The following changes could be labeled as “lessons learned.” First, a random sample of the population should be used, not a subset. That would resolve the second difficulty. This researcher would recommend not waiting as long between the beginning of the literature review stage and the beginning

of the data analysis stage, as was done with this dissertation (more than four years. This would resolve the third difficulty. Regarding how long to wait between administering each survey, there is a time that one must wait after the last survey before conducting another one, and there is a time by which one should conduct the next one, for fear of invalidating comparisons between consecutive surveys. In this case, there should be a one-year break between surveys. The second change regards contacts. A more thorough effort should be made to locate the e-mail addresses of the managers of the sites. Perhaps it would be useful to make contact with senior administrators of each Essential Health Links site prior to sending out the link to the Survey Monkey questionnaire. If that were done, the administrators would know to expect the links in their e-mail. In the present research, there was no discussion with administrators as to who should complete the questionnaires. This researcher merely found what seemed was the best contact at each site and added that person's e-mail address to a list (Appendix E and Appendix F).

There are many ways the questionnaire herein (Appendix B) could be improved. It could be expanded from 23 items to 37, to provide for eight items about subject matter/content, eight about culture/audience, eight about technology/distribution methods and eight for a new category — textual style — plus five for demographics. Despite the lengthy initial contact and consent forms (Appendix C and Appendix D, respectively), respondents did not appear bored with the survey. There were numerous open-ended comments (176 for 23 items or 7.6 comments per questionnaire item). More items would be appropriate on future surveys. While the existing items are about a Web developer's attitudes toward best practices in general for Essential Health sites, some of the 14 new Likert Scale items could address the Web developers' attitudes specifically about his or her site(s). There already are eight content items. They can be rewritten but no more should be added. Looking at potential audience and technology

variables, here are six possible new items: Audience — This category has six agree/disagree Likert Scale items. Two more should be added. 1) The languages that my site is available in sufficiently meet the needs of my audience. 2) The content on my site is culturally sensitive to my intended audience. Technology — This category has four items. Four more should be added: 1) Extra care was put into designing my site so it would be viewable on old computers with slow modem speeds. 2) My site was designed — successfully — for viewing by people who live in low-income countries. 3) My site was designed for viewing on a PDA as well as a computer. 4) My site is designed to be flexible so that it can be adapted to reflect changes in Web design standards. Textual Style — This is a new category. Eight new agree/disagree, Likert Scale-style items are appropriate to add: 1) The textual style of my Web site matches the education and expectations of the users of my site. 2) The textual style I chose is maintained throughout my site. 3) Web site content about health care that is derived from hardcopy journals should be rewritten in a different textual style to accommodate an online audience. 4) It is impossible to completely avoid bias when generating content for health care Web sites. 5) My site is completely devoid of bias. 6) When writing content for selling products on a health care Web site, it is appropriate to use a persuasive textual style. 7) My Web site appeals to the user's intellect. 8) My Web site appeals to the user's emotions.

Resolution of the fourth difficulty will happen when this researcher continues to visit Uganda and other African countries to gather data about health care content, plus cultural and technological differences. This researcher also recommends conducting a heuristic evaluation under the auspices of the University of Central Florida Institutional Review Board. In this scenario, a heuristic evaluation of selected sites linked off Essential Health Links would give health workers in Uganda who view such sites an opportunity to evaluate them objectively prior to administration of the questionnaire. Results

from a heuristic evaluation also would hopefully help this researcher write better questionnaire items for future surveys of Web developers.

In addition to a heuristic evaluation, a survey of health workers who use the Essential Health Links sites also should be conducted. Whereas a heuristic evaluation would allow health workers to evaluate specific sites objectively, a survey of health workers would give them an opportunity to express their attitudes toward best practices in general. The items asked of the Web developers in the present questionnaire could be rewritten so as to ask similar questions of health workers. For example, both Web developers and health workers could be asked whether they agree that Essential Health Links sites should include a link to some sort of verification that they contain accurate content? Do they agree that it is important that these Web sites identify or link to the sources of their content? Do they agree that it is important that these Web sites include disclaimers, about confidentiality of data and patient rights, when appropriate? Do they agree that it is important that these Web sites indicate when they were last updated? Do they agree that it is important that these Web sites be updated on a regular basis? And do they agree that it is important that the information on these Web sites help health workers make health care decisions? Okello's open-ended comments promoting registration show the value of seeking input from health workers in low-income countries.

As to the fifth difficulty, the wording of the items: Whenever the survey is changed, it should be updated to reflect respondents' comments. (One of the tenants of the digital research cycle is feedback. One purpose for receiving comments is to use it to write better questionnaires in the future so surveys will be better received.) Respondents commented on four items (Nos. 2, 12, 13 and 14) either that they did not understand the question or that they found the question confusing. These items should be revised for clarity.

Thus the revised conclusion herein is that Web developers have different attitudes toward technological needs of their audience than they have toward high quality of content and the cultural needs of their audience. More research could be done to determine why they feel differently about technological difficulties. Item No. 17 in the survey is grouped with technology items because it is about what is perceived in the West to be a usability function: “Should sites require registration?” An interview with a Ugandan physician indicated that in his country site registration is a technological solution to a cultural problem.

Part III: Future Research

Surveys and Projects

In the next section I will propose more future research related to health communication and Web development surveys, and other projects related to information and communication technologies (ICT) and low-income countries. A number of the examples of future research below reflect my desire to read about or conduct future research that replicates the work of others — or of myself — mentioned in this dissertation. The key to good research is to replicate the work of others to prove the validity of previous findings and the reliability of research methods. I also will propose several ideas for future research in communication theory, specifically focusing on how the digital research cycle could be used to aid in academic research, marketing and Web design.

Digital Storage and Transmission

During the early 2000s the Uganda Red Cross Society sought to ensure that it recruited blood donors who were not HIV positive by creating a recruitment program involving the collection of data on personal digital assistants (Kanobe, 2004). It would be interesting to conduct similar research in 2009 using the next generation of personal communication technology and a similar group of Ugandans.

Researchers could use Smartphones, cellular telephones that have many features similar to those on PDAs, plus telephony. Researchers may also consider replicating this program in a neighboring country, such as Kenya.

Sex Education Resources

Bleakley, Hennessy & Fishbein (2006) compared how Americans view sex education with how policymakers and research scientists feel about it. Respondents to his survey had three choices: abstinence only sex education, comprehensive sex education, and condom instruction. Bleakley, Hennessy and Fishbein found that 82 percent of participants indicated support for programs in which students are taught abstinence and other ways to avoid pregnancy and sexually transmitted diseases. Meanwhile, two-thirds (68.5 percent) favored teaching how to use condoms properly. Respondents were least likely to support abstinence-only programs (36 percent support and 50 percent opposition) across the three program options. But how do adolescents, particularly those in low-income countries such as Uganda, obtain their health education? Through the Uganda Media and You survey, students ages 12-18 (n = 500) were selected randomly at five secondary schools in Mbarara, Uganda, and asked to complete a questionnaire (Ybarra, Emenyonu, Nansera, Kiwanuka & Bangsberg, 2007). Some 93 percent participated. More than 81 percent of these adolescents stated that their parents and other adult role models are their primary sources for health information. More than 50 percent stated that they get their health information from books they read, more than 56 percent ask questions of siblings and friends and more than 38 percent stated that the Internet is their primary source for health information. It was determined that technology “may be an important health promotion tool in resource-limited settings.” What about other resource-limited settings? What about resource-rich settings? It would be interesting to conduct this survey again in Uganda, in a different district than Mbarara, as well as in the United States.

The research questions would be: Are the attitudes toward their health information sources significantly different for Ugandan adolescents from various districts? Are the attitudes toward their health information sources significantly different for Ugandan adolescents and American adolescents? Other questions would be: Are the attitudes toward the Internet as a primary health information source significantly different for Ugandan adolescents from various districts? Are the attitudes toward the Internet as a primary health information source significantly different for Ugandan adolescents and American adolescents? Ybarra, Emenyonu, Nansera, Kiwanuka & Bangsberg state that Ugandan adolescents who cite technology as a resource for health information are least likely to name just one source. They are most likely to also name their parents, their friends and books. Regarding similarities between behavior of Ugandan and American youth, Ybarra, Emenyonu, Nansera, Kiwanuka & Bangsberg cite Ybarra and Suman (2005) and state that the results they found regarding the health information sourcing habits of Ugandan youth are similar to those of adolescents in resource-rich countries. The difference between youth in resource-rich countries and those in low-income countries, Ybarra, Emenyonu, Nansera, Kiwanuka & Bangsberg state, is that those in resource-rich countries use the Internet to “expand and enhance” their health information resources, not replace them. Adolescents in resource-rich countries received health information from their parents, available doctors, at schools and on television long before the Internet was introduced. When Ybarra, Emenyonu, Nansera, Kiwanuka and Bangsberg state that the Internet replaces other resources they are stating that it is allowing them to leapfrog over existing “teaching centers” — that may not be educated (parents), comprehensive (classrooms) or accessible (television) — to receive digital health information. Hopefully, as the Internet becomes more available in resource-poor or low-income countries, it also will help parents to become more educated about health information. More Internet access hopefully also will allow schools to offer more health information and allow more overall publishing of health information on digital video.

Access will probably be achieved sooner in urban areas than rural areas.

Cancer in America

The Division of Cancer Control and Population Sciences at the National Cancer Institute conducted HINTS — the Health Information National Trends Survey —in 2003 and 2005. Use of the Internet as a source for information about cancer was one primary topic in this research. Another was use of the Internet to obtain health information about topics unrelated to cancer. Perhaps subsequent HINTS surveys should drill down below “Internet” and ask which specific information and communication technologies (ICT) men and women are using to get cancer and general health care information online. Are respondents still using Web browsers on desktop and laptop computers to get their information? Are they now using newer technologies, such as Blackberrys and other Smartphones?

Similar questions should be asked of people in developing countries, as Smartphones and other mobile communication technologies are being diffused in East Africa (Richard C. Blum Center for Developing Economies, n.d.). Professors and students at the Blum Center at the University of California, Berkeley, sought better organization for the paperwork associated with the Uganda Output-Based Aid (OBA) project, an “information intensive” endeavor “which seeks to address incentive gaps by paying health care providers directly for effective services rendered instead of paying for the service provision up front” (Richard C. Blum Center for Developing Economies). Initially this project served 1,000 patients per month. Their goal was to eventually serve 50,000 patients per year by distributing Smartphones to health workers who would use them both to reduce time for claim processing and to improve how they communicate with the OBA management team. No results for this project are readily accessible online. It would be interesting to get contact information for the aforementioned health care providers and the OBA management team (two separate entities with different agendas) and formulate

separate surveys to learn about the Blum Center project, including their attitudes about it. Here are some sample Likert Scale (strongly agree-agree-no opinion-agree-strongly disagree) questions: 1) Before the Smartphones were distributed, program management for OBA was information intensive, with too much paperwork and data entry. 2) The Smartphones are important because Ugandan health care facilities lack the electricity necessary to allow for use of desktop or laptop computers needed for the ODA project. 3) Smartphones adequately assist health care providers in organizing and distributing data for the information-intensive Uganda ODA project. The two groups are likely to have contrasting views about the technology and the content, based on their cultural differences.

Evaluating ICD Programs

As mentioned in the Literature Review, the Department for International Development in Great Britain developed a 40-page guide for “Monitoring and Evaluating Information and Communication for Development (ICD) Programmes” (2005). Among the guidelines, are “tools of good practice,” including “questionnaires and surveys, observation, focus group discussion, in-depth interviewing, pre-testing, key informant interviewing, exit polls/intercept interviews, role-playing, drama and story-telling; log keeping, tracking or tracer studies and Delphic surveys (used to identify trends).” It would be interesting to study what DIR calls the “practical difficulties” in evaluating ICD programs. They include: 1) “It is difficult to define a specific target audience for initiatives that have an effect over a wide area. (For example: health communication campaigns on TV and radio);” 2) “In some sectors (like farming), change happens slowly. So it is hard to measure impact over a short period;” 3) “It is not always clear that an ICD programme — rather than political, social or economic factors — has been responsible for change;” 4) “Some communications goals — good governance, social gain, empowerment — are difficult to measure objectively or put a value on;” 5) “If developing-world audiences have little media

choice, it can be hard to find out their opinions on the quality of ICD programmes;” 6) “It is difficult to evaluate communications in highly politicised areas or places of conflict;” and 7) “The fast-changing nature of new technologies makes it difficult to measure their impact” (Department for International Development, 2005). It would be interesting to conduct research to determine how to overcome these difficulties.

Looking at each difficulty: The first practical difficulty is defining a specific target audience. In 2007, in Bukinda, a town in the Kabale district of southwest Uganda, the Catholic Church used radio to promote the pending visit of an American physician and his team of health workers at the diocese’s clinic. The next time this physician and his team visit this or another clinic, a health promotion researcher could survey a sample of the patients who show up, to determine how they learned about the physician’s visit. Was it through casual word of mouth, church, radio, a print medium (flyers) or a digital means of communication? In this case the target audience is easily defined: the patients at the clinic.

The second practical difficulty is measuring short-term change in agriculture. An extension agent with access to information and communication technologies (ICTs), such as PDAs or Smartphones, can distribute them to farmers in low-income countries, to record and store input about daily progress in agriculture. Whether the data is how many plants are growing or how tall they are growing, spreadsheet software on an ICT would make the recording process much less labor intensive and the digital results that would be generated could be transmitted to other researchers. A researcher with a low budget could do a survey to determine how best to use Smartphones in the agriculture sector in low-income countries. A researcher with a large budget could distribute Smartphones to extension agents in low-income countries and monitor their use.

The third practical difficulty is determining what causes change. Was it an ICD program that

caused a change in behavior? Or was it economic, political or social factors? Perhaps it was a combination of all four. Perhaps the ICD itself is a government's or an organization's technological response to the economic, political and social concerns of the people who create the change. A study could be conducted wherein a specific change involving ICD is isolated and the researcher could endeavor to determine why it happened. For example, the first ministry of the Ugandan government allowed to launch a policy regarding information and communication technologies (ICT) is the country's ministry of tourism, trade and industry (AllAfrica.com, 2006). The ministry's goal is to improve the flow of information internally and externally. Ultimately, the policy and the projects that flow from it could increase tourism and trade by providing potential investors and tourists with timely information about Uganda — known as the Pearl of Africa. A researcher might study why this policy was adopted. Was it because of political pressure from within or outside this agency? Was it because of social concerns, such as the possibility that technology in Uganda is advancing rapidly enough that people in the tourism business there are ready to proceed to the next step in the marketing of their businesses, not unlike American businesses were ready to try e-commerce in the 1990s? Or was it for economic purposes, such as the possibility that other countries in East Africa (Kenya, Tanzania) already had ICT policies for tourism and Ugandan officials knew they needed to invest in ICT to remain competitive with their neighbors?

The fourth practical difficulty is measuring communication goals. According to the Department for International Development in Great Britain, empowerment, good governance and social gain are communication goals that are difficult to measure. Among women in Africa, the key to measuring empowerment is measuring the gender gap in essential social and economic categories (Longwe and Clarke, 1999). Gender gap is defined as the percentage of men minus the percentage of women “in any given category” (Longwe and Clarke). This definition creates many opportunities for future research on

gender gaps in education, health care and information and communication technologies (ICT) in low-income countries. For example: What is the gender gap among health workers in Kenya? Is the gender gap among health workers greater in Kenya or Tanzania, Kenya's neighbor in East Africa? What is the gender gap on Internet use in Congo? Is it greater in Congo or Sudan? What is the gender gap in South Africa on literacy? Is it greater in South Africa or Zimbabwe? Answers to these questions will help one to measure empowerment.

How does one measure good governance? One way to measure good governance — defined as “efficient and equitable allocation as well as effective utilization of the country's resources” (United Nations Development Programme, 2008) — is by assessing the level at which governments in developing countries have spent money to improve infrastructure for information and communication technologies (ICTs). South Africa's level of investment in ICT, measured as a percentage of gross national product, is consistent with developed nations (SAITIS, 2008). Meanwhile, the level of investment in ICT by other nations can be shown growing from 2001 to 2005: It remained at 8.4 percent in Jordan, but grew from 1.7 percent to 1.8 percent in Kuwait, from 2.1 percent to 2.3 percent in Saudi Arabia, from 3.4 percent to 3.6 percent in the United Arab Emirates and from 1.1 percent to 1.6 percent in Egypt (National Competitiveness Center, 2008). One tenth of one percent of the GDP of Saudi Arabia, Kuwait and the UAE is not a small sum of money, but the small percentage increases indicate that these nations do not — by definition — practice good governance. By contrast, in South Africa, where the GDP spending level on ICT is equal to that of Western nations, good governance is apparent. Either way, ICT funding as a percentage of GDP is an ideal topic for future research.

How does one measure social gain? In the United Kingdom, regarding rules for community radio operators, the government defines social gain as the achievement of four objectives: 1) providing “sound” broadcasting service to those who are underserved; 2) allowing discussion to occur and

opinions to be voiced; 3) using the medium to educate or train; and 4) creating homophily within a community and “the strengthening of links within it” (United Kingdom Office of Communications, 2006). For future research, it would be interesting to measure whether an Internet service provider provides social gain, using these criteria.

The fifth practical difficulty in evaluating ICD programs is determining the opinions of users in low-income countries — who have few media choices — about the quality of ICD programmes. The Gender Evaluation Methodology (GEM) for ICT Initiatives is a project that was instituted by the Women Networking Support Program (WNSP) of the Association for Progressive Communications (APC). The global program began in July 2001 with a goal of providing “a means for determining whether ICTs are really improving women’s lives and gender relations as well as promoting positive change at the individual, institutional, community and broader social levels” (International Development Research Centre, 2006, January 11). GEM, “a guide to integrating a gender analysis into evaluations of initiatives that use Information and Communication Technologies (ICT) for social change” (Association for Progressive Communications, 2008a), includes seven steps, which can be replicated in any country for future research: 1) Defining the intended use for the ICT and its intended users; 2) Identifying issues related to gender and ICT issues; 3) Completing a list of evaluation questions; 4) Setting qualitative and quantitative indicators, such as the number of women who use an ICT or attitudes toward ICTs; 5) Choosing tools and methods for gathering data; 6) Taking a gender perspective when analyzing data; and 7) “Incorporating learning into work” (Association for Progressive Communications, 2008b).

The sixth practical difficulty is evaluating ICT in political arenas or arenas of conflict. A civil war was fought from 1987 to 2007 in northern Uganda between forces of Joseph Kony’s Lord’s Resistance Army (LRA) and Uganda’s government (Reuters, 2007, April 26). In the wake of that conflict, in which more than 30,000 children were abducted by the LRA, various non-governmental

organizations have poured into Gulu, backed by funding to start relief programs. Gulu is both a political arena and an arena of past conflict in which organizations — such as the Payson Center for Technology Transfer and International Development of Tulane University — are embarking on ICT development programs (Payson Center for Technology Transfer and International Development, 2008). There will be four elements implemented during the three-year Payson project which began in 2008: 1) Empowering youth through outreach with an ICT training program; 2) Empowering youth through a university scholarship program; 3) An ICT capacity-building project at Gulu University; and 4) A program for providing ICT-assisted resources to community-based organizations (CBO) and non-governmental organizations (NGO). It would be interesting to follow this project through future research, to determine whether the ICT program or the scholarship program empowers youth. It would be helpful to learn whether the ICT capacity-building project actually helps or whether it becomes an example of wasted resources. Finally, it would be helpful to learn whether the CBO and NGO actually benefitted from the ICT-assisted resources. Knowledge of the successes of this project, which will have occurred in a highly politicized area of northern Uganda, will provide others with information that will help them create similar projects and deliver similar resources in other areas of Uganda, Africa and low-income countries.

The seventh practical difficulty is measuring the impact of new technologies. Because they change rapidly, it is difficult to evaluate ICT. Privileging Palm Pilots in a classroom full of iPhone users is one way to learn how fast technology changes. Another way is to diffuse a new technology and see that technology become outdated before the community has had a fair opportunity to adopt it. Monitoring adoptions was simpler before digital ICTs were diffused. Previously, diffusion researchers monitored the adoption of seeds, good health care habits and solar energy (Rogers, 1983). During the 21st century, monitoring the diffusion of a technology requires acknowledging the relative advantage of another technology that will come later because it is “perceived as being better than the idea it

supersedes” (Rogers, 1983, p. 213).

Health in Egypt

Researchers in Egypt studied health promotion tools for combating avian influenza. They introduced several communication interventions that comprised the Communication for Healthy Living (CHL) Project there. The project’s motto was “Your Health is Your Wealth” (Soul Beat Africa, 2006). A multi-tiered bird flu preparedness effort was implemented, featuring: television, radio, and press announcements; Egyptian government Web site support; hotline promotion; press inserts; press briefings and journalist training; provider fact-sheets; community mobilization in partnership with non-governmental organisations (NGO); and consumer fliers, posters, and other printed information materials. Then they conducted the Egypt Health Communication Survey (ECHS), hoping to determine how useful and successful its family health communication activities are. For future research, it would be interesting to conduct a similar project in China, Indonesia and Vietnam, three nations that — like Egypt — reported multiple bird flu cases in 2008 (World Health Organization, 2008, September 10). It also would be interesting to compare and contrast how the Egyptian government and a Western government promote tools for combating disease.

Knowledge of HIV/AIDS

What populations know about HIV/AIDS differs greatly from one culture to another within low-income countries and between low-income countries and developed countries. Mass communication plays a large role in how much people in developed countries know about HIV/AIDS. With access to newspapers, television, radio and the Internet, people in Western countries have many media sources to rely upon. They also can seek information from their parents, teachers and other sources of interpersonal communication. But what roles do mass communication and interpersonal communication play in increasing knowledge of HIV/AIDS in low-income countries? Interpersonal communication could be

harmful, if one's HIV status is revealed inappropriately. But interpersonal communication also could reduce stigmas or increase the use of condoms. Mass communication could have these same positive effects. Hutchinson, Mahlalela and Yukich (2007) researched these questions in South Africa. Looking at a 2002 household survey in the Eastern Cape Province, they measured levels of stigma, interpersonal communication, and willingness to disclose HIV test results and condom use. They found that mass communication and interpersonal communication result in "positive effects." Changes occur in knowledge and stigma, resulting in behavior change, partly because of media exposure and informal social networks. It would be helpful to replicate the household survey, called the 2002-2003 Eastern Cape Primary Health Care Evaluation Survey (ECPHCES), in other African countries or replicate it in South Africa in 2012.

Media and Condom Use in Africa

Sometimes researchers take large studies by others and pull small bits out for examination. Katz (2006) used the South Africa Demographic Health Survey of 1998 to learn about how information sources about AIDS affected condom use in South Africa. It was found that condom use among rural residents correlated with how many sources of information respondents had about AIDS, exposure to mass media and the language and education of the respondents. It would be helpful to look for similar data using the 2006 Uganda Demographic and Health Survey, released by the Uganda Bureau of Statistics (2007). The survey shows data for newspaper, radio and television use by Ugandan men and women. However it does not show Internet use. It would be helpful to include Internet use and/or the use of computer-mediated communication by Ugandan men and women in subsequent iterations of the Uganda Demographic and Health Survey.

Cyberchondria

Researchers at Microsoft who surveyed more than 500 people about their online health

information search experiences and studied Web search results have determined that people who self-diagnose their health issues on the Internet often think — mistakenly — that they have rare illnesses. This phenomenon is called cyberchondria. An example would be if someone who has persistent headaches does research online and thinks he has a brain tumor. Such an assumption can lead to “unnecessary anxiety, investment of time, and expensive engagements with health care professionals,” according to the researchers, White and Horvitz, as reported by Agence France Presse (Health on the Net Foundation, 2008, November 27). “People tend to look at just the first couple results,” Horvitz said. “If they find ‘brain tumor’ or ‘A.L.S.,’ that’s their launching point” (Markoff, 2008). Future research about this phenomenon is important because it would be important to encourage people in low-income countries to not become “victims” of cyberchondria when they begin to increase their use of online resources, and not after they have become frequent users of the World Wide Web. It would be interesting to conduct similar research after isolating Web search data collected from Internet users in low-income countries. The subsequent interviews would be helpful too. *The New York Times* reports that, “Of the more than 500 Microsoft employees who answered a survey on their medical search habits, more than half said that online medical queries related to a serious illness had interrupted their day-to-day activities at least once” (Markoff). Future research of cyberchondria in low-income countries could be done to establish a baseline there and certainly should not include data from surveys of employees of Microsoft, the most well known software company in the world. Future research in this area could include surveys of mothers using computers in India to learn how to read and students in secondary boarding schools in Uganda who receive high levels of medical care infrequently, most notably when medical teams travel to their country from the United States.

Abstinence in Uganda

More than five years ago Janet Museveni, the First Lady of Uganda, encouraged teens in that country not to engage in sex before marriage. Speaking as a mother, she advised against using condoms (Africa News, 2003). Four years later, in July 2007, this researcher witnessed a traveling troupe of young Ugandans, called Youth Support Group, in their teens and 20s, playing music, performing pro-abstinence skits and delivering an anti-drugs and anti-alcohol message on a breezy day at an Anglican school in Bukinda, Uganda. The students sat politely on the grassy field, listening as the troupe played upbeat music on instruments they brought with them, and sang into a portable audio system, most likely in the Ruchiga dialect, which is common in southwest Uganda. (It may have been Swahili, a more common, multinational language.) When the music ended, a young man and a young woman appeared on stage, speaking in an African dialect. From their gestures, it was obvious that he was portraying a young man who was pursuing her for a sexual relationship. Her character was interested in marriage first, then sex.

One of the troupe's leaders was Felix Mugabe, a student on vacation who was working for Youth Support Group, the non-governmental organization based in Mbarara, Uganda, that sponsored the visit. "I don't know how I can compare our Ugandan [young] adults with all African [young] adults in general, compared to the American [young] adults, but I feel, with the picture that I have gotten around in Africa, it's a bit high and very, very hectic, dealing with the young adults, because most of the times we have found them not buying exactly what we are teaching them and it is very hard to change their behaviors. But we have tried our level best," Mugabe said in an interview with this researcher (2007). "The behaviors of the youth around here, in Uganda mostly and specifically in Mbarara, where I stay, and in the western region; we experience the behaviors of smoking, smoking marijuana; they are

drinking, they are boozing, taking alcohol to the extent that they even take some powerful alcohol drinks and they still have got prostitution, drug abuse, all sorts of bad behaviors that you can think of.” Mugabe added that sex among youth in Uganda often occurs without condoms. Mugabe says the NGO sponsors troupes throughout the year — regardless of whether school is in session — because they want to work with students “irrespective of where they are.”

It would be interesting — for future research — to travel with one of these troupes for several months. Some of what they say to the students is in English, but not much. After securing an English-language transcript of their planned script/dialogue, one could interview the students before and after they observe the performances, to ascertain whether it has its intended effect, discouraging premarital sex, drug use, drinking and smoking. One also could interview the school administrators to get their perspective on the quality of the troupe’s program, as well as interview the troupe members. It also would be helpful to learn what the students are being taught about sex education at various grade levels at each school, to compare what is being taught at each grade level with the students’ attitudes about the subject matter before and after the performances. It also would be interesting to learn whether sex education in these schools includes a technological component. Do students access sex education material online in their schools? Do they use resources that are published in the West? Is this material culturally sensitive? Are these Web sites technologically usable? What is the textual style? Finally, do they learn about sex from their parents, at home? These questions are all relevant to the digital research cycle.

Communication Theory

Much has been written about communication theory since Lasswell and, later, Shannon and Weaver publicized their thoughts on the subject in the late 1940s. Lasswell (1948) famously

wrote about communication: “Who says what to whom in what channel with what effect?” (Fiske, 1990). A paper by Shannon (1948) is the basis for his seminal book with Weaver, written in 1949 and republished in 1964, which includes a model for how communication flows. That model served as inspiration for the digital research cycle. The model includes a sender and a receiver (audience), a message (content), a transmitter (technology) and feedback. What this model lacks is textual style. “A clear, concise writing style is the key to making your ideas stand out” (Random House, 2008). One of the ancillary findings of this research is that a new communication theory model can be proffered in the 21st century that includes subject matter or content, textual style, cultural sensitivity or audience, and technology or distribution method. Another finding is that within this model, these four variables of communication theory can be combined or linked to form four more variables. For example, one could study technical communication (textual style) and intercultural communication (audience) or one could combine these disciplines and study international technical writing. Another example: One could study intercultural communication and human-computer interaction or one could combine these disciplines and study cross-cultural user-interface design. The computer is the technology or distribution method in that scenario.

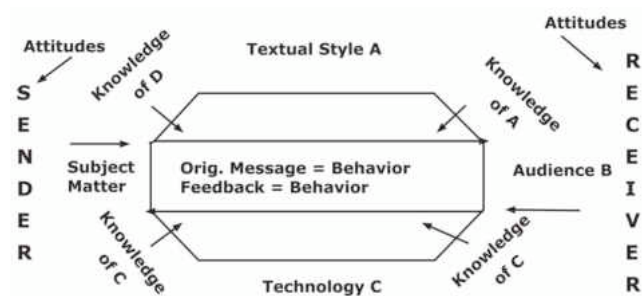


Figure 15. Digital Research Cycle

The digital research cycle offers a new way of looking at communication during the 21st century. It generates mental exercises to be used to improve academic research, Web design and marketing. Below are a few hypothetical examples of how one could use the tool in future research. Unlike other examples of future research, these examples are not necessarily related to health information, health workers in low-income countries or the Internet. As Figure 15 shows above, the digital research cycle involves a communicative act transmitted by a sender to a receiver, plus a subject matter (the message), an audience (the receiver), a textual style and a technology. The next section includes analyses of four projects that incorporate the digital research cycle.

Academic Research

Origin of a Theory

Here is an example of how future academic research can be aided by the digital research cycle. In 2002 a professor assigns his students to write papers in which they conceive theories about texts and technology. A student chooses to propose a theory about how Web design resembles live performance and to write a paper about his theory. He opts to use the digital research cycle to help him conduct his research. The student decides that a graphic artist is the sender of online information. Computer languages are the graphic artist's subject matter and objective journalism is his textual style. Regular news consumers are his audience and the Internet is the technology or distribution method the graphic artist uses to send information to the news consumers. (It is important to note that the audience in these instances of the digital research cycle is the graphic designer's audience, not the student's actual audience, the professor.) Computer languages are the subject matter because they are instrumental in how one conveys information on the Internet. In this case, the graphic artist is using hypertext markup language (HTML) to send information objectively to news consumers, using the Internet, which is

represented as the World Wide Web. The Web browser is the transmitter of the information. The packets of bits and bytes are the signal. The graphic artist has important attitudes about HTML, about journalism, about news consumers and about the Web. He also has valuable knowledge of HTML, of journalism, of news consumers and of the Web. The student's role is to research each of these variables to determine how they contribute to the graphic artist's behavior, which is manifest in his live performance — when he builds and maintains a news-oriented Web site.

The student combines computer languages and objective journalism and conceives online journalism. The year is 2002, and there is reluctance among some print journalists to embrace the Web. They do not appreciate the Web's ability to publish information instantly — like a live performance — in the same manner that radio and television journalists appreciate live performance. Taking the view that combining computer languages and journalism is a good idea, the student studies important moments in the nascent world of online journalism when breaking news online had an impact on news consumers — for good or bad — such as when Princess Diana, John F. Kennedy Jr. and Dale Earnhardt died, and anytime a hurricane threatened the United States. It is at these times, when news changes instantly and repeatedly, that the graphic artist typically has a positive attitude about computer languages and journalism and how they can impact society. The artist relies on his expert knowledge of computer languages and his growing knowledge of journalism to help him succeed as an overnight producer for an online news organization such as MSNBC.

The student combines computer languages and the World Wide Web and conjures up HTML and Web browsers. His quest here is to determine the roles various technologies play in harmonious Web design. HTML code is reminiscent of musical notes, which, if placed in the correct order, make the visual equivalent of a melodious sound. Browsers are instruments. Like different instruments play the

same notes differently, different browsers, such as Netscape Communicator and Microsoft Internet Explorer, portray the same code differently. It is the skillful musician who can play the same song on many instruments. Often it is the skillful graphic artist who can create the same — or virtually the same — page display on multiple browsers. Just like instruments have become more sophisticated over the last few centuries, to close the gap between them, so too has the gap been closed between various Web browsers over the past decade.

The student combines news consumers and objective journalism. As with the combination of objective journalism and computer languages, the focus here is on content. Patrons at concerts expect to be entertained and they appreciate masterful performances, the kind in which no notes are missed and the patron leaves feeling enriched. News consumers expect objectivity and accuracy. With the advent of online journalism they also expect speed. The nexus of objective journalism and news consumers' expectations is that point where the journalist is objective, accurate and fast. This is not an easy mark to hit, just as it is not always easy for a singer to hit a high note. But in both cases the audience expects excellence.

The student combines news consumers with the World Wide Web and conceives an array of usability issues. He studies Jakob Nielsen, who synthesizes these issues better than most. Like musicians rely on their instruments to work during a performance, graphic artists rely on browsers to function properly. More importantly, music patrons and news consumers expect these tools to work. If they don't, the feedback could be devastating. The patron stops attending concerts. The news consumer surfs to another site to get news about an event that is happening at that moment. He may not return to the original news site for a long time.

The result of the research above is a symphony of metaphors, and the student writes this:

The publishing of information on the World Wide Web is analogous to the live performance of music, theater or stand-up comedy. Each piece of computer hardware is a potential concert hall of Web design. Each [browser or] disk of Web publishing software — such as Dreamweaver or Frontpage — is an instrument. Each line of HTML code has a symbiotic relationship with musical notes. These tools are used in the performance of a work of art, one reason why Web designers are called “graphic artists” (Scott, 2003).

There are several ways that Web design is not like live performance. For example, a patron watching a live concert cannot “click” to a different performer the way he can click from one news site to another online. But the result of this exercise is an intriguing research paper about Web design being akin to live performance, and a theory for texts and technology.

Academic Research

Research Project Proposals

Here is another example of how academic research can be aided by the digital research cycle. A professor assigns a student to create a research project proposal involving quantitative methods. In this hypothetical exercise the student chooses to survey Filipino students across the United States as to their attitudes toward online learning and classroom instruction. The student decides to use the digital research cycle to perform a mental exercise to help him create this project. He literally surveys himself — asks himself questions — while composing the mock student survey.

To get started, the student combines his attitudes and knowledge of his subject matter — distance learning — with his attitudes and knowledge of his audience. He needs to learn more about Filipino students. The student believes distance learning is important generally, a way to educate people in faraway places while spending less money than face-to-face instruction. He

realizes the limitations of distance learning. Much is lost when learning is done electronically, even if teleconferencing is involved. The student remembers his days as an undergraduate when — assigned to watch a freshman economics class live on television — he chose instead to attend the class in the large, overcrowded auditorium where the professor gave his lecture. Some students prefer to have a physical connection with their professors. Do Filipino students, in general, feel the same way? Such a question would need to be included in the mock survey. The student knows little about Filipino students, so he would do research to learn that they “appear to be closer to majority populations than other recent immigrant populations, both in terms socioeconomic background and educational ambitions” (Hirschman, Lee and Emeka, 2004) but that they encounter difficulty assimilating in some geographic areas (Seattle Public Schools, 2005).

The student combines his attitudes and minimal knowledge of distance learning in general with that of his minimal knowledge and attitudes toward textual styles in distance learning, so that the way the message should be conveyed can be established. Distance learning requires no specific content. It can be used to teach any course, from anthropology to zoology. But it does require an ability to identify and implement the appropriate pedagogical approach. The student decides the proper pedagogical approach for distance learning involves three steps: “Using active and collaborative learning approaches, promoting meaningful feedback, and offering opportunities for intergroup collaboration, resource sharing, and collaborative writing” (Palloff and Pratt, 1999). These tools “have all been identified as fostering collaborative learning in virtual distance education” (Palloff and Pratt) and would help the student formulate the mock survey.

The student combines his attitudes and knowledge of his audience — Filipinos — with his attitudes and knowledge of the World Wide Web. One perspective tells us “Filipino youths especially in public schools are deprived of Internet literacy, as government resources are not enough to provide schools with computers and Internet connections” (Hicap, 2006). Another perspective tells us Filipinos “put great importance on marriage and family, friends, education, work, religion, society, and money, but not much importance on recreation, hobbies, or politics” (Sandoval, Mangahas and Guerrero, 1998). With much family emphasis on education but few government resources for computers, the attitudes of Filipino youth about distance learning are likely to be more negative than positive.

The student combines his attitudes and knowledge of textual styles with his attitudes and knowledge of the World Wide Web. The key term in the section above about textual styles is “collaborative learning.” It seems imperative that designers build collaboration into their distance learning programs and that survey questions reflect this factor. The Web would seem to be an ideal place for collaborative learning. But that has not been so. Warf, Vincent and Purcell (1999) laud the Internet for its ability to facilitate “geographic learning” but bemoan the fact that “few have experimented with it as a vehicle for long-distance interactive collaboration.” They write about a project in which students in the United Kingdom, Ireland, and the United States worked exclusively online on a joint project to analyze electronic representations of the Third World. They found that “although Web-based interactive learning is feasible and may complement traditional pedagogic formats, it is an imperfect substitute for traditional face-to-face interaction that occurs in the classroom.” Such a conclusion is highly instructive to the student writing the mock survey.

The student combines his attitudes and knowledge of his audience with his attitudes and knowledge of textual styles. Distance learning is a “first cousin of collaborative learning”

(Willingham, 2002). Collaborative learning takes the focus off the teacher and places it on students. Beasley (in Ware, 1999) saw an uneasy shift occur in the Philippines as the focus changed from teacher teaching to student learning in a science classroom. He was participating in a teacher development program that was trying to “move the teachers toward a more student-centered classroom.” The difficulty they encountered convinced many — even the teachers — that they needed more training to make the shift successful. This research tells the student creating the mock survey that a portion of it should be about the Filipino youths’ perceptions of their online teachers’ comfort with teaching student-centered, distance-learning courses.

Web Design

Web Site about Uganda

Here is an example of how the digital research cycle could be used to help build a Web site. As part of his Fall 2007 internship, a student plans to build a Web site (Uganda Group, 2007) about an ongoing project. He is working with a physician and a minister to create a non-profit organization — tentatively called the Uganda Group — that will raise money so they eventually can build a health clinic in Uganda. The student decides to use the digital research cycle to perform a mental exercise to help him build his site. For this communicative act, the student/intern/Web designer is the sender of the information. His subject matter is information he knows about his organization’s past, present and future. His audience is potential donors who will view the site. His textual style is persuasive and his technology is the World Wide Web. There are questions to ask and answer. What is his attitude toward his audience? What is his attitude toward persuasive writing? What is his attitude toward Web design? Importantly, what is his knowledge of Web design? Does he have the skills to do the job? What is his knowledge of his audience? What is his knowledge of writing persuasively? Can he make a strong

argument in favor of donating to the organization? These are the questions he asks himself. He will use the digital research cycle to help answer them.

The student wants to combine his attitudes and knowledge of his perceived audience with textual style (potential donors and persuasion). But he realizes he must first decide how to adjust a subject matter problem. Neither the doctor nor the minister in their group commits much time to the health clinic project. They do not move quickly to form a 501(c)3, which the group needs in order for the site to have credibility with potential donors. Nielsen (2000) suggests that organizational credibility is one of the tenants of “great Web design” (p. 92). The student enjoys writing persuasively, but how can he credibly ask his audience for donations on a Web site without first seeking non-profit status? This credibility issue is likely to become a legal issue, if not dealt with in the beginning. So the decision is made to alter plans for the site so that the audience is not potential donors, but rather members of the church the three men attend. The church membership becomes the new audience. Church members do not see the lack of non-profit status as a credibility issue, at least not yet, anyway. To them, the church is a non-profit. They can donate to the project through the church. But using the digital research cycle to separate the subject matter from the textual style and the audience helped the Web designer understand that until non-profit status is achieved, his audience cannot be potential donors outside the church. He will design the site accordingly.

The student then combines his attitudes and knowledge of the Uganda project (subject matter) and textual styles appropriate for communicating with church members. The student literally loves helping the people of Uganda and he has learned a lot about the country from planning and taking one 19-day trip in July 2007. He also loves his audience in the way that church members love one another. He knows they do not like to repeatedly be asked to make donations. He believes a friendly (no longer

“persuasive”) textual style will be appropriate. He hopes the result is content about the project presented in an uplifting tone the church members appreciate. The site he will build is informative. It will not suggest pledging donations.

The student combines his attitudes and knowledge of the Uganda project and the World Wide Web. The Web is ubiquitous in American society, but many church members are elderly. Those few who do use the Web will not be Internet experts. But the student believes this audience of church members will embrace a Web site created using a Yahoo! tool. This software does not create very elegant sites, but the church members do not expect elegance. There is little interactivity, but the audience expects little more than a Contact Us page. There is no animation option, but the audience likely would be distracted — not entertained — by animation. Further, the student loves to look at and use nice Web sites, and he is trained to know how to articulate — non-technically — how to improve them visually, but he is not a very skilled Web developer. Time is short. The semester is over in four months. No time to learn sophisticated Web design techniques. Thus the Yahoo! tool — which does most of the coding automatically — suits his needs well.

The student combines his attitudes and knowledge of his audience and of the World Wide Web. He decides that the best way to convey the subject matter to his audience is through photographs. The result is a picture gallery with images of the eight Americans who traveled to Uganda for 19 days in July 2007. The slideshow is the result of the student using the digital research cycle to ask himself, “How can I best utilize the resources I brought back from Uganda — photographs — on the World Wide Web?”

The result is a Web site that has a home page and seven links: About Us, Fitting In, Uganda Glossary, Getting Started, Presentations, Press Release and Photo Gallery. The student concludes that without the digital research cycle to guide him, he would not have asked himself the various important

questions that he addressed during the pre-design and design stages. The result is a Web site he can be proud of, that church members can access without feeling like it is just another attempt to raise money. Sometimes fundraising must be gradual. Future iterations of this site may include PayPal, an online billing service. But by then the organization will be a 501(c)3 and the audience will be different; it will expect to be solicited for donations. The Web developer will then adjust the cycle to determine how the new audience affects the other variables.

Marketing Project

Sponsorship Marketing

Here is an example of how the digital research cycle can aid in completing a marketing project. A marketing consultant is hired to generate sponsorships for a 50th anniversary celebration for the City of North Port, Fla. and to serve as project manager of the celebration. The consultant combines her attitudes and knowledge of her subject matter — promoting North Port and its history among potential sponsors — with her attitudes and knowledge of textual styles. She needs to choose one. Promoting a city's golden anniversary requires knowledge of the city. It would be difficult for a consultant to sell sponsorships in North Port without first learning as much as she can about the city. After reading a history book about North Port — already written for the 50th anniversary celebration — the consultant would view city archives and interview residents who had been instrumental in the city's growth during the previous 50 years, as well as residents who work hard but stay out of the limelight. From her experience, the consultant knows she should employ a persuasive but professional textual style in the flyers and brochures she distributes to potential sponsors. Armed with this information, the consultant can contact these businesses, such as Publix Supermarket, Home Depot, Lowe's Home Improvement Stores and Wal-Mart.

The consultant realizes that the project needs promotion. She combines her attitudes and knowledge of North Port with the World Wide Web and determines that she should build a Web site about the anniversary celebration. It should include information about the celebration events as well as information about the city and its history. The Web site is a central tool in her effort to promote the celebration to citizens. But it also is an ideal tool for promoting the celebration to potential sponsors. The consultant combines her attitudes and knowledge of her audience — potential sponsors — with her attitudes and knowledge of the World Wide Web. She realizes the power of the Web to generate interest in events — thousands of “sponsorship forms” are linked off other areas of the Web — but she also realizes that there are some areas of the anniversary site written for North Port citizens to read and other areas written for potential sponsors to view. The two areas should be clearly defined. She does not want citizens to feel like they are being “sold” the celebration; and while she wants potential sponsors to feel like they already are part of the city’s “family,” she does not want to present to them an unprofessional image.

Summary

The results of these four exercises include an academic paper about theories of text and technology, a research project proposal for a survey of Filipino students, a Web site created to promote an effort to build a health clinic in Uganda and a marketing project — including Web site — created to promote a city’s anniversary. The processes described herein occur to many people participating in academic research, Web design and modern marketing. The digital research cycle does not just explain how something should be done for the first time, but also how people in various professions have implemented a step-by-step process — sometimes unconsciously — for years.

One can describe how people breathe in one sentence or in 100 pages. The digital research cycle describes processes in detail. Through the digital research cycle one also can take two or three variables to find a fourth. For example, hypothetically, a freelance journalist wants to write a story and sell it. What will the subject matter be? Who will his audience be? Which medium will he publish it in/on? What textual style will he employ? The freelance writer must decide which question to answer first. Then the answers to the other questions will follow. Perhaps he decides his subject matter will be flow blue china, a type of dinnerware manufactured in Great Britain in the 1800s. This subject matter will be of interest to a very narrow audience: collectors of this type of china. Where should the information be published? The writer does some research and learns that Collectors News magazine reportedly “sets the highest journalistic standard by providing articles for those collecting or interested in antiques, collectibles and contemporary collectibles” (Collectors News, 2008). The digital research cycle works with any subject matter that can be communicated digitally. The goal of anyone interested in promoting digital literacy should be to promote the digital research cycle as a way to work through communication issues related to marketing, Web design and academic research. Communication scholars could study the cycles herein, use the digital research cycle and share it with their students.

APPENDIX A: PRELIMINARY SURVEY

Appendix A: Preliminary Survey

It is important to monitor the public's usage of my Web site.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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The target audience for my Web site is easily determined.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important to survey my Web site's audience.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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Such a survey should be conducted scientifically.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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In surveying my Web site's audience, it's important to ask both quantitative and qualitative questions.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important to understand the culture of my Web site's audience.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important to consider the financial constraints faced by my Web site's audience.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important to ensure that my Web site is presented in the language(s) that my audience uses.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important to consider the religious beliefs of my Web site's audience.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important to consider the social customs of my Web site's audience.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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There is more I could do to ensure that my assumptions about the cultures of the health workers and their clients are accurate.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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Generally, my Web site's audience is below where it should be in terms of general medical knowledge.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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I have a very good idea of who the target audience is for my Web site.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important to use the latest software to track my Web site's usage statistics.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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We believe it is important to monitor our target countries so we will be prepared in case we need to add a version in another language in the future.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It's important for sites such as mine to be written in regional languages.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It's important for sites such as mine to be written both in the languages of the former colonial powers.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It's up to the health workers in my target country to translate the information on my Web site.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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There are health workers in my target country that would benefit from viewing my site but can't do so because of a language barrier.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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My Web site plays an active role in the decisions made by health workers.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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Use of my Web site is an educational experience.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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Use of my Web site is an example of "distance education.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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The government of the source country should play a role in assuring the validity and reliability of public health Web sites such as mine.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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The government of the target country should play a role in assuring the validity and reliability of public health Web sites such as mine.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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My role as project manager is to ensure that my site maintains high standards of quality.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important to consider hardware constraints in target countries.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important to consider bandwidth constraints in target countries.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important to distinguish between content for urban and rural health workers.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important to consider the traditional medical practices of my Web site's audience.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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I feel like the users have come to rely on my Web site.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important to monitor how exposure to my Web site has resulted in behavior change by health workers.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important to monitor how exposure to my Web site has resulted in behavior change by the clients of health workers.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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As the project manager of this Web site, I strive to maintain objectivity.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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As the project manager of this Web site, I am a change agent.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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I see the relationship of my site to health workers as that of teacher and pupil.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important to follow up with health workers after they adopt the treatments and techniques advocated on my Web site.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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The users of my Web site have sufficient computer skills.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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Motivating health workers in developing countries is a more complex challenge than motivating those in the West.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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Training health workers in developing countries is a more complex challenge than training those in the West.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important for the designers of my Web site to create consequence strategies to encourage behavior change among health workers.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important to recommend healthcare solutions that are economical.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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The goal of my Web site is to change a health worker's behaviors.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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My site is in direct competition with another Web site.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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The solutions my Web site offers are top/down.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important to inject the users' input in the solutions offered by my Web site.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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My Web site takes into consideration the infrastructure challenges of a health worker's community.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It's important to ask health workers whether the solutions on the site are effective.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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When family or village traditions interfere with our solutions, we find out about it.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important to reward health workers for implementing our solutions.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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The morals and standards of the health worker's country are equal to those of the site designer's country.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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The morals and standards of the health worker's country are higher than those of the site designer's country.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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The users of my Web site have the resources to implement the solutions we recommend.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important for us to understand village hierarchies.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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Most of the health workers who view my site are native to the country in which they are working.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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Most of the health workers who view my site are native to the former colonial powers.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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Health workers who view my site are adequately trained to work in their profession.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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My site reinforces the notion that health workers are “healers.”

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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Health workers are resistant to change.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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Health workers’ clients are resistant to change.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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The users of my Web site generally find online healthcare information to be credible.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important for the designers of my Web site to be very knowledgeable about the people in the developing countries they serve.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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The health workers who view my site are primarily from which profession:

- Epidemiologist
- Health communicator
- Health trainer
- Medical doctor
- Midwife
- Nurse

The content on my site is what the health workers need.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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My site addresses issues pertaining to developing countries.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important to market my Web site.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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Quality control of the content on my Web site is vital.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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I am never concerned that the content on my site is medically incorrect.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important that the content on my site is presented in an ethical manner.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important to update my site often.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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To be successful, a site such as mine needs multimedia such as audio, video or videoconferencing.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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Sites such as mine should be allowed to sell medication.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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All of the people who work on my Web site are properly credentialed.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important to display my site's professional credentials and licensure vividly on the home page.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important to ensure that the content on my site is geared toward an audience from the South or East, not the North or West.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important for sites like mine to focus mainly on treatments and cures for diseases.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important for sites like mine to focus mainly on prevention.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
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It is important that the project manager(s) at my Web site also be scientists.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

My site and others like it are competitive.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

It is important to have an e-mail newsletter option on a site such as mine.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

It is important to have feedback such as online polls.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

It is important to award users certificates for accomplishing tasks at my Web site.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

It is important to offer positive reinforcement to users of my Web site.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

It is important for sites like mine to teach health workers how to communicate with their clients

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

My site needs more content.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

The graphics on my site are culturally appropriate.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

The content on my site is culturally appropriate.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

My site is unique. No one else does what we do.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

It is OK for sites like mine to sell products that they promote.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

Sites like mine should be designed to make a personal connection with readers.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

Sites like mine should consider village hierarchies.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

Content on sites like mine should be written in a positive tone (do this), rather than a negative tone (don't do that).

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

Sites like mine should have a homepage link to some sort of verification that the site contains authentic content.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

The content on my Web site is validated before it is posted.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

Web sites like mine should have a working relationship with the developing country's ministry of health.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

Web sites like mine should have a working relationship with the developing country's ministry of education.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

Feedback from health workers helps improve my site.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

It is important to replace old content with new content on the same subject, when it's available.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
----------------	-------	------------	----------	-------------------

Web sites like mine should focus on helping one type of healthcare professional, not a team of professionals who work together.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
----------------	-------	------------	----------	-------------------

Web sites like mine should be redesigned very infrequently.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
----------------	-------	------------	----------	-------------------

Web sites like mine should have a discernable theme.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
----------------	-------	------------	----------	-------------------

Web sites like mine should have a Contact Us page.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
----------------	-------	------------	----------	-------------------

It is OK for Web sites like mine to have advertising.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
----------------	-------	------------	----------	-------------------

My site has good long-term financial prospects.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
----------------	-------	------------	----------	-------------------

The content on my site is sufficiently narrow in scope.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
----------------	-------	------------	----------	-------------------

The content on my site is fresh.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

More than one person sets the agenda of my site.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

The content on my site is accurate.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

It is important for sites like mine to have a sister hardcopy journal.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

It is important for sites like mine to make information available via CD-ROM as well.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

The content on my site is important to health workers.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

It is important for sites like mine to cite the sources of their content.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

Sites like mine should include indicators of when it was last updated.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

Sites like mine should include appropriate disclaimers

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

It is important to get new information online as fast as possible. Vetting can come later.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

It is important for sites like mine to include an online suggestion box.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

The content on my site is thoroughly researched.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

It is important for sites like mine to include hotlinks to source material.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

It is important for sites like mine to make the site's medical professionals available to health workers for consultation.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

It is important for content on sites like mine to be refereed.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

It is important for sites like mine to include question and answer sections with medical professionals.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

It is important for sites like mine to generate new medical innovations, not summarize what is already known.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

Sites like mine should give both sides of an issue/

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

For sites like mine, certification by the International Committee of Medical Journal Editors is important.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

For sites like mine, it's important to have a relationship with Medline or Index Medicus.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
-------------------	-------	---------------	----------	----------------------

APPENDIX B: QUESTIONNAIRE

Appendix B: Questionnaire

Survey

Content (1-8)

Audience (9-16)

Technology (17-20)

Demographics (21-23)

Please respond honestly to the following items regarding your beliefs about how Web sites such as yours should be developed.

[] I am at least 18 years of age and completing this survey constitutes my informed consent.

Content

1. It is important that these Web sites include a link to some sort of verification that the site contains accurate content.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
----------------	-------	------------	----------	-------------------

2. It is important that these Web sites identify or link to the sources of their content.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
----------------	-------	------------	----------	-------------------

3. It is important that these Web sites include disclaimers, about confidentiality of data and patient rights, when appropriate.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
----------------	-------	------------	----------	-------------------

4. It is important that these Web sites indicate when they were last updated.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
----------------	-------	------------	----------	-------------------

5. It is important that these Web sites be updated on a regular basis.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
----------------	-------	------------	----------	-------------------

6. It is important that the information on these Web sites help health workers make healthcare decisions.

Strongly Agree Agree No Opinion Disagree Strongly Disagree

7. It is important that these Web sites contain high quality healthcare content.

Strongly Agree Agree No Opinion Disagree Strongly Disagree

8. It is important that these Web sites maintain a tone best described as objective.

Strongly Agree Agree No Opinion Disagree Strongly Disagree

9. It is important that Web sites include a mechanism for providing feedback, such as a Contact Us page with an e-mail link back to the site manager.

Strongly Agree Agree No Opinion Disagree Strongly Disagree

10. Information on Web sites should be written in such a way that the target audience completely understands it.

Strongly Agree Agree No Opinion Disagree Strongly Disagree

11. It is important that these Web sites carefully consider feedback from users in decisions about the site's textual content.

Strongly Agree Agree No Opinion Disagree Strongly Disagree

12. It is important that the target audiences of Web sites be clearly defined.

Strongly Agree Agree No Opinion Disagree Strongly Disagree

13. Web sites should be designed to be useful to (You may choose one or more response):

- a. Workers at primary care health centers (clinics)
- b. Workers at regional hospitals
- c. Workers at tertiary care or referral hospitals
- d. Workers at ministries of health
- e. Workers at international health organizations
- f. Consumers/patients
- g. Not sure
- h. _____

14. The health workers who should view these Web sites are primarily from which profession (You may choose more than one):

- a. Anthropologists
- b. Epidemiologist
- c. Health communicators
- d. Health learning material producers
- e. Health trainers
- f. Journal publishers
- g. Librarians
- h. Medical doctors
- i. Midwives
- j. Nurses
- k. Policy makers
- l. Researchers
- m. Technologists
- n. Not sure
- o. _____

15. It is important that these Web sites carefully consider feedback from users on decisions about the site's graphical content.

Strongly Agree Agree No Opinion Disagree Strongly Disagree

16. It is important that these Web sites be usable by people for whom English is a second language.

Strongly Agree Agree No Opinion Disagree Strongly Disagree

17. It is important that these Web sites require registration.

Strongly Agree Agree No Opinion Disagree Strongly Disagree

18. It is important that these Web sites be accessible with a dialup modem.

Strongly Agree Agree No Opinion Disagree Strongly Disagree

19. It is important that these Web sites load quickly, even if it means limiting graphics.

Strongly Agree Agree No Opinion Disagree Strongly Disagree

20. It is important that these Web sites be usable for both novice and advanced Internet users.

Strongly Agree Agree No Opinion Disagree Strongly Disagree

21. My Web site linked off Essential Health is dedicated to:

- a. A disease or syndrome (such as malaria)
- b. A body part (such as the eyes)
- c. A geographic region (such as sub-Saharan Africa)
- d. Other _____

22. The person who completed this survey is:

- a. A healthcare professional with Web design experience
- b. A healthcare professional with no Web design experience
- c. A Web developer with a medical background
- d. A Web developer with no medical background
- e. Other _____

23. The managers of this Web site are based in what country:

APPENDIX C: INITIAL CONTACT

Appendix C: Initial Contact

July 31, 2008

Edward S. Scott
University of Central Florida
203 Fairway Drive
Venice, Florida, USA 34285
escott05@comcast.net

Dear XXXXX Contact:

I am a graduate student at the University of Central Florida in Orlando, Florida. I am conducting a survey of the developers or managers of Web sites devoted to healthcare in developing countries, to learn about the developers' attitudes toward certain perceived best practices.

Your Web site was selected because it represents an organization whose Web site address is linked off the Essential Health Links site at <http://www.healthnet.org/essential-links/index.html>. If you are not the developer or Web site manager, then I am hoping you will forward this e-mail to the appropriate recipient for me.

The person who should complete this survey is the person at your organization who is primarily responsible for managing the site.

It is my hope that my research, based on the results of this survey, will eventually help developers of Web sites such as yours to learn from each other. I hope to be the conduit that helps you to share that information.

This 23-item survey should take about 10 minutes of your manager's time. I am not offering any payment for participation. However, I will share my results with you and others in the healthcare and Web design communities. As noted above, I am based in Venice, Fla., USA, and can be contacted at any time via e-mail.

The professor in charge of my research is Craig Saper, Ph.D. He can be reached at csaper@pegasus.cc.ucf.edu. If you would like to contact him by phone, please first make arrangements via e-mail.

Research at the University of Central Florida is carried out under the oversight of the Institutional Review Board (IRB). Questions or concerns about research participants' rights may be directed to UCF Institutional Review Board Office, the University of Central Florida, Office of Research and Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246. The phone numbers are (407) 882-2276 and (407) 823-2901. The office is open from 8:00 am to 5:00 pm Monday through Friday except on UCF official holidays.

Thank you very much for your cooperation and for forwarding this e-mail. If you are the person primarily responsible for managing the site, thank you in advance for completing the survey.

Sincerely,

Ed Scott
University of Central Florida

Web Design Survey Consent Form

Dear Web developer/site manager:

You are among several hundred people in your profession who have been selected to participate in an anonymous online survey about Web development. You were selected because you are a contact for an organization whose Web site address is linked off the Essential Health Links site at <http://www.healthnet.org/essential-links/index.html>. Your participation and honest answers are crucial for creating a list of perceived best practices for Web developers building sites to be viewed by health workers in developing countries.

- The following questions ask for your perceptions of practices in your profession.
- This survey is completely voluntary. You may choose not to participate or not to answer any specific questions. You may skip any question you are not comfortable answering. You can decline to participate in this survey if you wish. There are no anticipated risks.
- Do not take this survey if you are under the age of 18.
- The survey is anonymous but because your opinion is sought, the questions may seem personal in nature. You can be assured that your responses will never be matched with your name, since IP addresses will be removed from the survey when it is submitted.
- This study examines Web developer attitudes toward perceived best practices. The information will be used to contribute to research on best practices in Web design for health-oriented Web sites devoted to developing countries.
- Composite data will be assessed to determine the most effective ways for Web developers to build sites to be accessed by health workers in developing countries.
- Please answer questions honestly.

- This online survey will take approximately ten minutes to complete. It can be accessed by clicking on the link below to get started. If you choose to participate, you can complete the survey right now, or anytime up until July 31, 2008.
- Your privacy and research records will be kept confidential to the extent of the law. Authorized research personnel, employees of the University of Central Florida Department of English, and other individuals, acting on behalf of UCF, may inspect the records from this research project.
- The results of this study may be published. However, the data obtained from you will be combined with data from others in the publication. The published results will not include your name or any other information that would personally identify you in any way.
- If you have any questions about this survey, please contact principal researcher Ed Scott at escott05@comcast.net.
- Research at the University of Central Florida is carried out under the oversight of the Institutional Review Board (IRB). Questions or concerns about research participants' rights may be directed to UCF Institutional Review Board Office, the University of Central Florida, Office of Research and Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246. The phone numbers are (407) 882-2276 and (407) 823-2901. The office is open from 8:00 am to 5:00 pm Monday through Friday except on UCF official holidays.
- My dissertation director is Craig Saper, Ph.D., a professor at the University of Central Florida. He can be contacted at csaper@pegasus.cc.fl.us
- Again, to complete the survey online, click on the link below to get started.

Thank you for taking the time and thought to complete this survey. We sincerely appreciate your participation.

Here is the link to the survey:

http://www.surveymonkey.com/s.aspx?sm=p3EONUjrJzD_2fCQPoznWFCQ_3d_3d

Sincerely,

Ed Scott, MS
UCF doctoral candidate

APPENDIX D: CONSENT DOCUMENT

Appendix D: Consent Document

Web Design Survey Consent Form

Dear Web Developer/Site Manager:

You are among several hundred people in your profession who have been selected to participate in an anonymous online survey about Web development. You were selected because you are a contact for an organization whose Web site address is linked off the Essential Health Links site at <http://www.healthnet.org/essential-links/index.html>. Your participation and honest answers are crucial for creating a list of perceived best practices for Web developers building sites to be viewed by health workers in developing countries.

- The following questions ask for your perceptions of practices in your profession.
- This survey is completely voluntary. You may choose not to participate or not to answer any specific questions. You may skip any question you are not comfortable answering. You can decline to participate in this survey if you wish. There are no anticipated risks.
- Do not take this survey if you are under the age of 18.
- The survey is anonymous but because your opinion is sought, the questions may seem personal in nature. You can be assured that your responses will never be matched with your name, since IP addresses will be removed from the survey when it is submitted.
- This study examines Web developer attitudes toward perceived best practices. The information will be used to contribute to research on best practices in Web design for health-oriented Web sites devoted to developing countries.
- Composite data will be assessed to determine the most effective ways for Web developers to build sites to be accessed by health workers in developing countries.
- Please answer questions honestly.
- The online survey will take approximately ten minutes to complete. The survey can be accessed by clicking on the link below to get started. If you choose to participate, you can complete the survey right now, or anytime up until July 31, 2008.
- Your privacy and research records will be kept confidential to the extent of the law. Authorized research personnel, employees of the University of Central Florida Department of English, and other individuals, acting on behalf of UCF, may inspect the records from this research project.
- The results of this study may be published. However, the data obtained from you will be combined with data from others in the publication. The published results

will not include your name or any other information that would personally identify you in any way.

- If you have any questions about this survey, please contact principal researcher Ed Scott at escott05@comcast.net.
- Research at the University of Central Florida is carried out under the oversight of the Institutional Review Board (IRB). Questions or concerns about research participants' rights may be directed to UCF Institutional Review Board Office, the University of Central Florida, Office of Research and Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246. The phone numbers are (407) 882-2276 and (407) 823-2901. The office is open from 8:00 am to 5:00 pm Monday through Friday except on UCF official holidays.
- My dissertation director is Craig Saper, Ph.D., a professor at the University of Central Florida. He can be contacted at csaper@pegasus.cc.fl.us
- Again, to complete the survey online, click on the link below to get started.

Thank you for taking the time and thought to complete this survey. We sincerely appreciate your participation. Your time and effort in helping us gather information is greatly appreciated and will ultimately help professionals in higher education meet programming and funding needs.

Sincerely,

Ed Scott, MS
UCF doctoral candidate

APPENDIX E: INASP HEALTH LINKS

Appendix E: INASP Spreadsheet

TRIP Database	http://www.tripdatabase.com/
Health Systems Trust	http://www.hst.org.za/
Library of Congress	http://www.loc.gov/rr/international/portals.html
WHO: Health Topics	http://www.who.int/topics/en/
Africa: Health	http://www.sas.upenn.edu/African_Studies/About_African/ww_heal.html
Africa SOTS: Health	http://www-sul.stanford.edu/depts/ssrg/africa/health.html
MaghrebMed	http://www.maghrebmed.com.tn/
Medilinks	http://medilinkz.org/index.asp
SA HealthInfo	http://www.sahealthinfo.org/
WHO/AFRO Library	http://www.afro.who.int/library/index.html
WHO: ROFA	http://www.afro.who.int/
WOYAA	http://woyaaonline.com/links/HEALTH/
ASEAN disease SN	Bad link
Asian AIDS Resources	http://www.growthhouse.org/asianhiv.html
Indian Medical Sites	http://www.qmedin.com/medsites/
Indian Medlars Cente	http://www.indmed.nic.in
South Asian PH Forum	http://www.saphf.org/
WHO S. Asia Reg. Off.	http://w3.whosea.org/index.htm
WHO West Pac. Reg.	http://www.wpro.who.int/
BIREME	http://www.bireme.br/
BIREME VH Library	http://www.bireme.br/bvs/ihome.htm
CARDIN	Bad link
CIMF	http://www.cimfweb.org/
Disasters info	http://www.disaster-info.net/socios_eng.htm
Health Info. Locator	http://lis.bvs.br/xml2html/xmlListT.php?xml[]=http://lis.bvs.br/lis-Regional/l/define.xml&xsl=http://lis.bvs.br/lis-Regional/home.xsl
Hisp. Health Bel./Prac.	http://www3.baylor.edu/~Charles_Kemp/hispanic_health.htm
Infomed	http://www.cubasolidarity.net/infomed/www.infomed.sld.cu/indice.html
CAPHIS	http://www.caphis.mlanet.org/resources/CHISspanish.html
LANIC	http://www1.lanic.utexas.edu/la/region/health/index.html
Medical Spanish Sites	http://www.southtexascollege.edu/library/guides/medicals spanish.htm

Pan Am Health Org. Viva La Vida Sana	http://www.paho.org/ http://nnlm.gov/train/vive/vivelavida.html
EurasiaHealth KN	http://www.eurasiahealth.org/index.jsp
African Index Medicus	Bad link
BIREME: Database Search	http://bases.bvs.br/public/scripts/php/page_show_main.php?home=true&lang=en&form=sir
Index Medicus for SE Asia	Bad link
IMEMR	http://www.emro.who.int/HIS/VHSL/lmemr.htm
LILACS	http://www.bireme.br/bvs/lihome.htm
NISC-SA	http://www.nisc.com/
pm2mail	Bad link
SHARing Point Server	http://sharingpoint.shared-global.org/
Source Bibliographic Database	http://www.asksource.info/index.html
African Networks	http://www.afronets.org/
COHRED	http://cohred.org/cohred/Home.action
Global Forum for Health Research	http://www.globalforumhealth.org
Medical Research Council of South Africa	http://www.mrc.ac.za/
SHARED	http://www.shared-global.org/main.asp
AFRO-NETS	http://www.afronets.org/
AID Workers Network	http://www.aidworkers.net/
HealthNet News: Publications	http://list.healthnet.org/mailman/listinfo/
HIF Net@WHO	http://www.inasp.info/health/hif-net.html
ProCOR	http://www.procor.org/
RHINO Listserv	http://www.rhinonet.org/tikiwiki/tiki-index.php?page=RhinoListServ
SatellLife: Electronic Discussion Groups	http://www.essentialdrugs.org/
South Asian Public Health Forum	http://www.saphf.org/
Abstracts of Cochrane Reviews	http://www.cochrane.org/cochrane/revabstr/mainindex.htm
Clinical Evidence	http://www.bmjournals.com/subscriptions/countries.shtml/
Telemedicine Research Centre	http://www.mrc.ac.za/telemedicine/telemedicine.htm
TRIP Database	http://www.tripdatabase.com/
Helping Health Workers	http://healthwrights.org/books/helpinghwlearn.htm

Where There is No Doctor	http://www.healthwrights.org/books/WTINDonline.htm
Bioline International	http://www.bioline.org.br/
Biomedical Journals from India	http://medind.nic.in/
Bireme VH Library	http://www.bireme.br/bvs/l/ihome.htm
BMJ: Free access	http://www.bmjournals.com/subscriptions/countries.shtml/
Health InterNetwork Access to Research Initiative	http://www.healthinternetwork.org/scipub.php
HighWire	http://highwire.stanford.edu/lists/devecon.dtl
PERI	http://www.inasp.info/peri/index.shtml
PERI II	http://www.inasp.info/peri/free.shtml
La Santé Tropicale	http://www.santetropicale.com/
Licensing Resources	http://www.library.yale.edu/~llicense/develop.shtml
pm2mail	Bad link
Scientific Electronic Library Online (SCIELO)	http://www.scielo.org/index.php?lang=en
Health and Family Planning	http://www.usaid.gov/locations/sub-saharan_africa/publications/health.html
HealthLink Bulletin	http://www.hst.org.za/generic/33
Healthlink Worldwide	http://www.healthlink.org.uk/pubs.html
SciDevNet	http://www.scidev.net/
Source Database	http://www.ids.ac.uk/sourcesearch/serials.htm
WHO: Health Topics	http://www.who.int/topics/en/
WHO: WHOLIS	http://www.who.int/library/database/index.en.shtml
WHO: Fact Sheets	http://www.who.int/mediacentre/factsheets/
All Africa	http://allafrica.com/health/
Eldis/HRC	http://www.eldis.org/health/index.htm
HealthNet News	Bad link
Medilinks	http://medilinkz.org/index.asp
World Health News	http://www.worldhealthnews.harvard.edu/
WHO: Disease Outbreak	http://www.who.int/csr/don/en/
WHO: WH Reports	http://www.who.int/whr/en/
AMREF	http://www.amref.org/
AIHA	http://www.aiha.com/index.jsp
CDC: Global Health	http://www.cdc.gov/OGH/
Int. Health Exchange	http://www.ihe.org.uk/

MRC of South Africa	Bad link
Equinet	http://www.equinetafrica.org/
PAHO	http://www.paho.org
PHRplus	http://www.phrplus.org/
QAProject	http://www.qaproject.org/
SARA	http://sara.aed.org/
UK Partnership	http://www.ukglobalhealth.org/
WADN	http://www.wadn.org/
WHO	http://www.who.int
WHO: Africa	http://www.afro.who.int/
WHO: East Med.	http://www.emro.who.int/index.asp
WHO: SE Asia	http://w3.whosea.org/index.htm
WHO: Wesern Pacific	http://www.wpro.who.int/
HNP Stats	http://devdata.worldbank.org/hnpstats/
Medlinks	http://medilinkz.org/index.asp
UNICEF: Stat Data	http://www.unicef.org/statistics/index.html
POPIN	http://www.un.org/popin/
WHO: Evidence and Info	http://www3.who.int/whosis/menu.cfm
WHOSIS	http://www3.who.int/whosis/menu.cfm
WHO: Weekly Report	http://www.who.int/wer/en/
Clip Art for Health Comm.	http://www.hcmn.org/clipart/clipart.php
Photoshare	http://www.photoshare.org
TDR Image Library	http://www-nt.who.int/tropical_diseases/databases/imagelib.pl
Ethnomed	http://www.ethnomed.org/
Geneva Foundation	http://www.gfmer.ch/000_Homepage_En.htm
healthtraining.org	healthtraining.org
Helping Health Workers	http://healthwrights.org/books/helpinghwlearn.htm
Int. Health CD-ROM Ex.	INASP site
Vital Signs	http://www.joannabriggs.edu.au/best_practice/bp8.php
Helina	http://www.helina.org/helina/default.asp
Health Communication Partnership	http://www.hcpartnership.org/Healthwise/

Division of Nutrition for Health and Development Communicable Disease Surveillance & Response	http://www.who.int/nut/ http://www.who.int/csr/disease/meningococcal/en/
Virtual Anesthesia Machine World Anaesthesia Online	http://vam.anest.ufl.edu/ http://www.nda.ox.ac.uk/wfsa/
Public Healthcare Laboratory	http://www.phclab.com/
Healthwrights WHO Oral Health	http://healthwrights.org/books/WTINDentistonline.htm http://www.whocollab.odont.lu.se/index.html
Skin Care Nursing	http://www.isng.soton.ac.uk/
IDF Diabetes e-Atlas WHO Diabetes Mellitus World Diabetes Foundation	http://www.eatlas.idf.org/ http://www.who.int/topics/diabetes_mellitus/en/ http://www.worlddiabetesfoundation.org/
Emergency Nutrition Network Harvard Program in Refugee Trauma	http://www.enonline.net/ http://hpvt-cambridge.org/
Eye Pathologist ICEH Low Vision Gateway OptoNews Africa/Vision Care Unite for Sight Vision 2020 Vision 2020 e-resource	http://www.eyepathologist.com/ http://iceh.org.uk/ http://www.lowvision.org/ http://www.ona.kabissa.org/ http://www.uniteforsight.org/ http://www.v2020.org/main_page.asp http://www.laico.org/v2020resource/homepage.htm
AEGIS BioAfrica Census Bureau Global AIDS Surveillance HIV InSite Synergy Project	http://www.aegis.com/ http://bioafrica.mrc.ac.za/ http://www.census.gov/ipc/www/hivaidsd.html http://www.who.int/emc-hiv/ http://hivinsite.ucsf.edu/InSite.jsp?page=Country http://www.synergyaids.org/summaries.asp

AIDSMAP	http://www.aidsmap.com/
EngenderHealth	http://www.engenderhealth.org/
GALEN	http://www.iapac.org/home.asp?pid=62
HIV and AIDS Minicourse	http://www.engenderhealth.org/res/onc/hiv/index.html
AIDS Treatment and Practice	http://www.aidsmap.com/en/main/sitemap.asp
Living Well with HIV /AIDS	http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/005/Y4168E/Y4168E00.H
Reproductive Health Outlook	http://www.rho.org/html/hiv_aids.htm
AIDS and Culture	http://portal.unesco.org/en/ev.php-URL_ID=2932&URL_DO=DO_TOPIC&URL_SECTION=
WHO: '3by5 Initiative'	http://www.inasp.info/health/links/hivclin.html
Fact Sheets on HIV/AIDS for nurses and midwives	http://www3.who.int/whosis/factsheets_hiv_nurses/index.html
Glossary of Terms	http://www.engenderhealth.org/res/onc/hiv/glossary/index.html
UNAIDS: Terminology	http://www.unaids.org/en/resources/terminology.asp
AF-AIDS	http://archives.hst.org.za/af-aids/
Fondation du Present	http://www.hivnet.ch/fdp/forums.html
Archive of an email discussion list on HIV/AIDS	http://citation.thread.free.fr/sida.html
ProCAARE	http://www.procaare.org/
ProNutrition	http://www.pronutrition.org/discgroups-hiv.php
SAFCO	http://www.onusida-aoc.org/Eng/Safco.htm
AfroAIDSInfo	http://www.afroaidsinfo.org/portal/dt?desktop.suid=uid=authlessanonymous,ou=people,o=a
AIDS Resources	http://www.geocities.com/kim1122b/AIDS.html
AIDS Channel	http://www.aidschannel.org/
Asian AIDS Resources	http://www.growthhouse.org/asianhiv.html
Development Gateway: HIV/AIDS	http://topics.developmentgateway.org/hiv
UNIFEM	http://www.genderandaids.org/
Global Reproductive Health Forum	http://www.hsph.harvard.edu/Organizations/healthnet/HIV/info.html
HIV InSite	http://hivinsite.ucsf.edu/InSite
Annotated Bibliography	http://www.rho.org/html/hiv_aids_bibliography.htm
IAPAC	http://www.iapac.org/
HIV/AIDS Research Guide	http://www.eldis.org/hivaids/
Population and Health Information Share	http://www.phishare.org/
Red Ribbon	http://www.redribbon.co.za/

Family Health International	http://www.fhi.org/en/index.htm
African Counseling Network	http://www.geocities.com/kim1122a/
AIDS Alert International	http://www.aidsalert.org.uk/
Artists Against AIDS Worldwide	http://www.aaaw.org/
Campaign to Stop Global AIDS	http://www.stopglobalaids.org/
Family Health International: HIV/AIDS	http://www.fhi.org/en/hivaids/index.htm
Global AIDS Alliance	http://www.globalaidsalliance.org/
Global AIDS Program	http://www.cdc.gov/nchstp/od/gap/
Global Network of People Living With AIDS	http://www.gnpplus.net/aim.html
Global Treatment Access Campaign	http://www.globaltreatmentaccess.org/
HANSAR	http://www.uow.edu.au/health/Hansar/index.html
Infectious Diseases Society of America	http://www.idsociety.org/HIVMA_Template.cfm/
Hope for African Children Initiative	http://www.hopeforafricanchildren.org/
International AIDS Economics Network	http://www.iaen.org/index.htm
International AIDS Vaccine Initiative	http://www.iavi.org/
International Association of Physicians in AIDS Care	http://www.iapac.org
International HIV/AIDS Alliance	http://www.aidsalliance.org/sw1280.asp
Regional AIDS Training Network (RATN)	http://www.ratn.org/
UNAIDS: Upcoming Conferences	http://www.unaids.org/en/events/calendar.asp#
UNESCO: Action Against AIDS	http://portal.unesco.org/en/ev.php-URL_ID=1134&URL_DO=DO_TOPIC&URL_SECTION=
AIDS Bulletin	http://www.mrc.ac.za/aids/aidsbulletins.htm
AIDS Media Center	http://www.aidsmedia.org/
AIDS Pandemic in the 21st Century	http://www.census.gov/prod/2004pubs/wp02-2.pdf
AIDSchannel.org	http://www.aidschannel.org/
AllAfrica.com: AIDS	http://allafrica.com/aids/
The Communication Initiative: HIV/AIDS section	http://www.comminit.com/hivaids/
Confronting AIDS: Public Priorities in a Global Epidemic	http://www.worldbank.org/aids-econ/confront/confrontfull/
Development Gateway: HIV/AIDS	http://topics.developmentgateway.org/hiv
Family Health International: HIV/AIDS	http://www.fhi.org/en/hivaids/index.htm
Global HIV/AIDS	http://www.kaisernetwork.org/aids2002/
HealthNet News on AIDS	http://list.healthnet.org/mailman/listinfo/hnn-aids
HIV and AIDS Online Minicourse	http://www.engenderhealth.org/res/onc/hiv/index.html
Impending Catastrophe	http://www.kff.org/southafrica/20000515a-index.cfm
Integrated Regional Information Networks	http://www.irinnews.org/AIDSfp.asp

International AIDS Economics Network	http://www.iaen.org/index.htm
PANOS: HIV/AIDS Reports	http://www.panos.org.uk/resources/reportsection.asp?ID=1001
Population Council: HIV/AIDS	http://www.popcouncil.org/hivaids/index.html
Resource Guide for Sex Educators	http://www.comminit.com/materials/ma2004/materials-115.html
Sourcebook of HIV/AIDS Prevention Programmes	http://www.schoolsandhealth.org/Sourcebook/sourcebook%20intro.htm
Southern Africa AIDS Info. Dissemination Service	http://www.safaids.org.zw/
UNAIDS	http://www.unaids.org/en/media/fact+sheets.asp
WHO: Communicable Disease Surveillance & Response	http://www.who.int/csr/don/en/
WHO: Fact Sheets	http://www.who.int/topics/en/

African Malaria Vaccine Network Trust	http://www.amanet-trust.org/
Malaria: An Online Resource	http://www.rph.wa.gov.au/labs/haem/malaria/
Malaria Foundation International	http://www.malaria.org/
Malaria Research Capacity in Africa	Bad link
Multilateral Initiative on Malaria	http://www.mim.su.se/
Multilateral Initiative on Malaria: Events	http://www.mim.su.se/english/events/index.html
Nature Outlook - Malaria	http://www.nature.com/nature/outlook/malaria/index.html
PREMA-EU	http://www.prema-eu.org/
Pocket Guide to Malaria Prevention and Control	http://www.vnh.org/Malaria/Malaria.html
PubMed	http://www.ncbi.nlm.nih.gov/
Roll Back Malaria: A Global Partnership	http://www.who.int/malaria/home
SA Healthinfo: Malaria	http://www.sahealthinfo.org/malaria/malaria.htm
WHO/TDR Malaria Database	http://www.wehi.edu.au/MalDB-www/who.html
WHO Division of Control of Tropical Diseases: Malaria	http://www.who.int/topics/malaria/en/

10/66 Dementia Research Group	http://www.alz.co.uk/1066/
Diseases and Disorders	http://www.mic.ki.se/Diseases/F03.html
Emergency Psychiatry Services Handbook	http://www.vh.org/adult/provider/emergencymedicine/Psychiatry/TOC.html
Harvard Program in Refugee Trauma	http://hprt-cambridge.org/
Mental Health Atlas	http://www.cvdinfobase.ca/mh-atlas/
Where there is no Psychiatrist	http://www.rcpsych.ac.uk/publications/gaskell/shopping/system/index.html
WHO: Mental Health	http://www.who.int/mental_health/en/
World Federation for Mental Health	http://www.wfmh.com/

WHO: Child and Adolescent Health and Development	http://www.who.int/child-adolescent-health/
WHO: Division of Nutrition for Health and Development	http://www.who.int/nut/
Iron World Site Map	http://www.micronutrient.org/IDPAS/SiteMap.html
The Nutrition Society	http://www.nutritionssociety.org/
Standing Committee on Nutrition	http://www.nutritionssociety.org/
Alliance for Cervical Cancer Prevention	http://www.alliance-cxca.org/
The Max Foundation	Bad link
WHO: Child and Adolescent Health and Development	http://www.who.int/child-adolescent-health/
Facts for Life	http://www.unicef.org/ffl/
Nutrition Training Materials	http://www.nutritionssociety.org/
Perinatal Educational Programme	http://www.pepcourse.co.za/
Rehydration Project	http://www.rehydrate.org/
WHO: Child and Adolescent Health and Development	http://www.who.int/child-adolescent-health/
Alliance for the Prudent Use of Antibiotics (APUA)	http://www.tufts.edu/med/apua/
Boletin Farmacos	http://www.boletinfarmacos.org/
Campaign for Access to Essential Medicines	http://www.accessmed-msf.org/index.asp
essentialdrugs.org	http://www.essentialdrugs.org/index.php
International Drug Price Indicator Guide	http://erc.msh.org/mainpage.cfm?file=1.0.htm&id=1&temptitle=Introduction&module=DMP&sh
International Network for the Rational Use of Drugs	http://www.inrud.org/
International Network of Drug Information Centres	http://www.essentialdrugs.org/indices/about.php
Standard Treatment Guidelines & Essential Drugs Lists	http://www.hst.org.za/publications/52
WHO: Essential Medicines Library	http://mednet3.who.int/eml/eml_intro.asp
WHO: Health Technology and Pharmaceuticals	http://www.who.int/technology/
WHO: Model Formulary	http://www.who.int/medicines/organization/par/formulary.shtml
Eldis/HRC Health Resource Guide	http://www.eldis.org/health/index.htm
Disasters info Disastres	http://www.disaster-info.net/socios_eng.htm
Effective Health Care Alliance Programme	http://www.liv.ac.uk/lstm/ehcap/introduction.htm
Public Health Care Laboratory	http://www.phclab.com/

WHO: Communicable Disease Surveillance and Response	http://www.who.int/csr/disease/en/
International Clinical Epidemiological Network (INCLEN) Supercourse: Epidemiology, the Internet and Global Health	http://www.inclen.org/ http://www.pitt.edu/~super1/
Bulletin of the WHO: The International Journal of PH HealthNet News on Community Health Journal of Health & Population in Developing Countries Morbidity and Mortality Weekly Report (MMWR)	http://www.who.int/bulletin/en/ http://list.healthnet.org/mailman/listinfo/hnn-ch http://www.jhpdnc.unc.edu/ http://www.cdc.gov/mmwr//mmwr_wk.html
Health-E Communication Materials Media Clearinghouse	http://www.comminit.com/healthecomm/ http://www.hcpartnership.org/mmc/
Alliance for Health Policy and Systems Research Designing/Conducting Health Systems Research Projects Effective Health Care Alliance Programme Health Manager's Toolkit Human Resources for Health Dossier Innovative Technologies for Health Care Delivery (INTRAH) Management Sciences for Health (MSH) portable Knowledge Assessment Development System PubMed – Free Fulltext Articles on Health Systems (2500+) Routine Health Information Network (RHINO) WB: Health Systems Development	http://www.alliance-hpsr.org/jahia/Jahia/ Bad link http://www.liv.ac.uk/lstm/ehcap/introduction.htm http://erc.msh.org/mainpage.cfm?file=1.0.htm&module=toolkit&language=english http://www.eldis.org/healthsystems/dossiers/hr/ http://www.intrah.org/ http://www.msh.org/ http://pkads.bis.ucc.ie/ http://www.ncbi.nlm.nih.gov/ http://www.rhinonet.org/tikiwiki/tiki-index.php?page=HomePage http://web.worldbank.org/
Refindia	http://www.refindia.net/
Adolescent Reproductive Health Network (ARHNe) Midwives Information and Resource Center (MIDRS) POPLINE Reproductive Health Outlook United Nations Population Information Network	http://www.nutrition.uio.no/ARHNe/ http://www.midirs.org/hel/hel_h_nsf/welcome?openform http://db.jhuccp.org/popinform/basic.html http://www.rho.org/html/rh_resources.htm http://www.un.org/popin/
Alliance for Cervical Cancer Prevention (ACCP) Basic Support for Institutionalizing Child Survival (BASICS) Best Practices Compendium	http://www.alliance-cxca.org/ http://www.basics.org/publications/ http://www.advanceafrica.org/compendium/

A Book for Midwives: Care, Pregnancy and Women's Health	http://www.hesperian.org/midwives_chapters.htm
Center for Prenatal Diagnosis	http://www.cpdx.com/
Contraceptive Methods	http://www.rho.org/html/contraceptive_methods.htm
Engenderhealth	www.engenderhealth.org
Family Health International	http://www.fhi.org/en/index.htm
Geneva Foundation for Medical Education and Research	http://www.gfmer.ch/000_Homepage_En.htm
Global Reproductive Health Forum	http://www.hsph.harvard.edu/Organizations/healthnet/HIV/info.html
Human Reproduction: Clinical, Pathological	http://medstat.med.utah.edu/kw/human_reprod/
Innovative Technologies for Health Care Delivery (INTRAH)	http://www.intrah.org/
Iron World Site Map	http://www.micronutrient.org/IDPAS/SiteMap.html
JHPIEGO	http://www.jhpiego.org/
JHU: Center for Communication Programs	http://www.jhuccp.org/
Medical Abortion: facts and info for healthcare professionals	http://www.medicationabortion.org/index.html
Perinatal Education Programme	http://www.pepcourse.co.za/
Population Reference Bureau	http://www.prb.org/
PREMA-EU	http://www.prema-eu.org/
Repro-ado	http://www.repro-ado.org/index.html
Reproductive Health Online (ReproLine)	http://www.reproline.jhu.edu/
ReproLine: Tools for Trainers	http://www.reproline.jhu.edu/english/5tools/5tools.htm
Reproductive Tract Infections	http://www.rho.org/html/rtis.htm
Reproductive Tract Infection: An Introductory Overview	Bad link
Sexual and Reproductive Health Papers	No link
Reproductive health resources	http://www.who.int/reproductive-health/publications/index.htm
Sexual Violence Research Initiative	http://www.who.int/svri/en/
<hr/>	
HIPNET Listserv	http://www.rhgateway.org/mailman/listinfo/hipnet
International Reproductive Health Medical Education	http://lists.infoforhealth.org/mailman/listinfo/irhmeded
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Health and Family Planning Publications (USAID)	http://www.usaid.gov/locations/sub-saharan_africa/publications/health.html
IPPF Medical Bulletin	http://www.ippf.org/ContentController.aspx?ID=830
Journal of Health & Population in Developing Countries	http://www.jhpdnc.unc.edu/
Outlook	Bad link
Pop Reporter	http://www.infoforhealth.org/popreporter/
RAINBOW: Related Links	http://www.rainbo.org/
Reproductive Health Outlook	http://www.rho.org/

Sexual Health Exchange	http://www.kit.nl/frameset.asp?/ILS/exchange_content/Default.asp&fnr=1&
Development Gateway: Population and Reproductive Health Info Project	http://topics.developmentgateway.org/population http://www.infoforhealth.org/
Nursing, Midwifery and Allied Health Professionals (NMAP)	http://nmap.ac.uk/
POPNET: Directory for Global Population Information	http://www.prb.org/Template.cfm?Section=PRB&template=/Content/ContentGroups/Popnet_notice/Temp_PopNet_notice.htm
Population and Health Information Share	http://www.phishare.org/
Reproductive Health and HIV/AIDS Resources on the Internet	http://www.fhi.org/en/index.htm
Reproductive Health Gateway	http://www.rhgateway.org/
WHO: Reproductive Health and Research	http://www.who.int/reproductive-health/index.htm
Alliance for Cervical Cancer Prevention (ACCP)	http://www.alliance-cxca.org/404.htm
Reproductive Health Outlook: Cervical Cancer	http://www.rho.org/
Alan Guttmacher Institute (AGI)	http://www.guttmacher.org/
Alliance for Cervical Cancer Prevention (ACCP)	http://www.alliance-cxca.org/
EC/UNFPA Initiative for Reproductive Health in Asia	http://www.asia-initiative.org/
Health Information and Publications Network (HIPNET)	http://www.hopkinsmedicine.org/ccp/
International Planned Parenthood Federation	http://www.ippf.org/
Population Council	http://www.popcouncil.org/index.html
Program for Appropriate Technologies in Health (PATH)	http://www.path.org/
RAINBO	http://www.rainbo.org/
United Nations Population Fund (UNFPA)	http://www.unfpa.org/
Guidelines for Management of Sexually Infections	http://www.who.int/reproductive-health/publications/rhr_01_10/index.html
Resource Guide for Sex Educators	http://www.comminit.com/materials/ma2004/materials-115.html
Reproductive Tract Infections	http://www.rho.org/html/rtis.htm
Reproductive Tract Infection: An Introductory Overview	Bad link
Sexually Transmitted Diseases and other RTI	http://www.popcouncil.org/pdfs/frontiers/reports/RTIS_GEP_FINALI.pdf
Sexually Transmitted Infections	http://sti.bmjournals.com/
Sexually Transmitted Infections Online Mini-Course	http://www.engenderhealth.org/res/onc/sti/
Book of Orthopaedics and Traumatology	http://www.bonetumour.org/book/APTEXT/index.html
E-Hand.com: The Electronic Textbook of Hand Surgery	http://www.eatonhand.com/index.htm

National Center for Infectious Diseases, U.S Pacific Public Health Surveillance Network WHO: Communicable Disease Surveillance and Response WHO: Disease Outbreak News	http://www.cdc.gov/ncidod/index.htm http://www.spc.int/phs/PPHSN/ http://www.who.int/csr/disease/en/ http://www.who.int/csr/don/en/
Action Against Infection: a Newsletter for WHO and its Partners Emerging Infectious Diseases Illustrated Lecture Notes on Tropical Medicine La Santéropicale sur Internet	http://www.who.int/infectious-disease-news/newsletter/index.html http://www.cdc.gov/ncidod/eid/index.htm http://www.itg.be/itg/DistanceLearning/LectureNotesVandenEndenE/index.htm http://www.santetropicale.com/
American Society of Tropical Medicine and Hygiene Hardin Md - Tropical Diseases Institute of Tropical Medicine: Links to Selected Websites Médecine Topicale	http://www.astmh.org/ http://www.lib.uiowa.edu/hardin/md/tropical.html http://lib.itg.be/biblinks.htm http://www.chu-rouen.fr/ssf/tropfr.html
Association des Léprologues de Langue Française International Federation of Anti-Leprosy Associations (ILEP) International Leprosy Association LEPRA (British Leprosy Relief Association) TDR: Leprosy WHO: Cholera WHO: Elimination of Leprosy as a Public Health Problem WHO: Meningococcal Disease	http://www.sfdermato.net/allf/ http://www.ilep.org.uk/content/home.cfm http://www.leprosy-ila.org/ http://www.lepra.org.uk/home.asp http://www.who.int/tdr/diseases/leprosy/ http://www.who.int/topics/cholera/en/ http://www.who.int/lep/ http://www.who.int/csr/disease/meningococcal/en/
le site de l'infectiologie française WHO: Emerging and Other Communicable Diseases WHO: Infectious Diseases	http://www.infectiologie.com/ http://www.who.int/csr/don/en/ http://www.who.int/topics/en/
ANOFEL African Association for Medical and Veterinary Malacology Confronting AIDS: Public Priorities in a Global Epidemic Drugs for Neglected Diseases Initiative	http://www.med.univ-angers.fr/service_serveur/invite/anofel/ http://www.aamvm.dk/ http://www.worldbank.org/aids-econ/confront/confrontfull/ http://www.dndi.org/

Global Alliance to Eliminate Lymphatic Filariasis	http://www.filariasis.org/index.pl
La Maladie du Sommeil	http://www.trypano-humaine.com/
OnchoNet	http://www.science.smith.edu/departments/Biology/SWILLIAM/OnchoNet/OnchoNet.html
Parasitologie	Bad link
WHO: African Programme for Onchocerciasis	http://www.who.int/pbd/blindness/onchocerciasis/en/
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Occurrences of Ebola	http://www.mcb.uct.ac.za/ebola/ebopage.htm
Global Polio Eradication Initiative	http://www.polioeradication.org/
National Institute for Virology, South Africa: Virology Updates	http://www.nicd.ac.za/
Smallpox and its eradication	http://www.who.int/emc/diseases/smallpox/Smallpoxeradication.html
WHO: Ebola Haemorrhagic Fever	http://www.who.int/csr/disease/ebola/en/
WHO: Influenza	http://www.who.int/csr/disease/influenza/en/
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Institut Pasteur	http://www.pasteur.fr/externe
Médecine Tropicale	http://medecinetropicale.free.fr/legal.html
<hr/>	
Anti-Tuberculosis Drug Resistance in the World	http://www.who.int/tb/en/
Global Alliance for TB Drug Development	http://www.tballiance.org/
Health and Development Initiative India	http://www.healthinitiative.org/html/index.htm
International Union against Tuberculosis and Lung Disease	http://www.iatld.org/full_picture/fr/frameset/frameset_ns6.phtml
SA HealthInfo: Tuberculosis	http://www.sahealthinfo.org/tb/tb.htm
Stop TB Partnership	http://www.stoptb.org/
TB Training Tools	http://www.healthinitiative.org/html/tbtraining/index.htm
tb.net-the Global TB Network	http://www.south-asia.com/ngo-tb/Default.htm
Tuberculosis: Strategy, Operations, Monitoring and Evaluation	http://www.who.int/tb/en/
WHO: Global Tuberculosis Program	http://www.who.int/tb/en/
<hr/>	
Arab Resource Collective (ARC)	http://www.mawared.org/
Association for Health Information and Libraries in Africa (AHILA)	http://www.ahila.org/
Child-to-Child Trust	http://www.child-to-child.org/
The Communication Initiative	http://www.comminit.com/healthcomm/
Development Gateway	http://home.developmentgateway.org/
Digital Dividend Project Clearinghouse	http://wriws1.digitaldividend.org/wri/app/index.jsp
Directory of Medical Libraries in Africa	http://www.ahila.org/directory.php

Donation Programs for Books, Journals and Media	http://ublib.buffalo.edu/libraries/units/hsl/donationprograms.html
Dreyfus Health Foundation	http://www.dhfglobal.org/
Electronic Publishing Trust for Development (EPT)	http://www.epublishingtrust.org/
Exchange: a Networking and Learning Programme	http://www.healthcomms.org/
FreeForAll	http://www.geocities.com/wfb_2/freeforall.html
Global Directory of Health Information Resource Centers	http://www.iwsp.org/directory.htm
Handbook for Telecenter Staffs	http://ip.cals.cornell.edu/commdev/handbook.cfm
Health Communication Materials Network (HCMN)	http://www.hcmn.org/
Health Information and Health Organizations in Africa	http://www.columbia.edu/cu/lweb/indiv/africa/cuvi/health.html
Health InterNetwork	http://www.healthinternetwork.org/src/registration.php
Healthlink Worldwide	http://www.healthlink.org.uk/
Hesperian Foundation	http://www.hesperian.org/
INASP-Health Directory: 2003/2004	http://www.inasp.org.uk//pubs/healthdir/index.html
International Health CD-ROM Exhibition	http://www.inasp.info/health/workshop32/cdroms.html
International Health Impact Assessment Consortium (IMPACT)	http://www.ihia.org.uk/
Libraries for All: How to Start and Run a Small Library	Bad link
Licensing Digital Information: Developing Nations Initiatives	http://www.library.yale.edu/~llicense/develop.shtml
Media Materials Clearinghouse (MMC)	http://www.hcpartnership.org/mmc/
NGO Networks for Health	http://www.ngonetworks.org/
Partnerships In Health Information (Phi)	http://omni.ac.uk/hosted/phi/
pm2mail	Bad link
portable Knowledge Assessment Development System (pKADS)	http://pkads.bis.ucc.ie/
Reproductive Health Outlook:ICTs	http://www.rho.org/html/ict.htm
Resource Centre Manual, 2nd edition	http://www.healthlink.org.uk/pubs/rc-man-text.html
Satellife	http://www.satellife.org/
Scientists for Health and Research for Development (SHARED)	Bad link
Teaching-aids at Low Cost (TALC)	http://www.talcuk.org/
World Health Report 2003	http://www.who.int/whr/en/
World Health Report 2004: Knowledge for Better Health	http://www.who.int/whr/en/
World Report on Knowledge for Better Health 2005	http://www.who.int/rpc/meetings/pub1/en/
Resources for International Librarians, Health Professionals	http://www.nlm.nih.gov/psd/ref/international.html

APPENDIX F: ESSENTIAL HEALTH LINKS

Appendix F: Essential Health Links

TRIP Database <http://www.tripdatabase.com/>
Health Systems Trust <http://www.hst.org.za/>
Library of Congress <http://www.loc.gov/rr/international/portals.html>
WHO: Health Topics <http://www.who.int/topics/en/>
Africa: Health http://www.sas.upenn.edu/African_Studies/About_African/ww_heal.html
Africa SOTS: Health <http://www-sul.stanford.edu/depts/ssrg/africa/health.html>
MaghrebMed <http://www.maghrebmed.com.tn/>
Medilinks <http://medilinkz.org/index.asp>
Resources on Africa Health and Disease <http://www.africa.upenn.edu/health/diseases.htm>
SA HealthInfo <http://www.sahealthinfo.org/>
WHO/AFRO Library <http://www.afro.who.int/library/index.html>
WHO: ROFA <http://www.afro.who.int/>
ASEAN disease SN <http://www.asean-disease-surveillance.net/>
Asian AIDS Resources <http://www.growthhouse.org/asianhiv.html>
Indian Medical Sites <http://www.qmedin.com/medsites/>
Indian Medlars Cente <http://www.indmed.nic.in>
South Asian PH Forum <http://www.saphf.org/>

WHO S. Asia Reg. Off. Chamchuklina@searo.who.int

WHO West Pac. Reg. <http://www.wpro.who.int/>

BIREME <http://www3.bireme.br/bvs/bireme/1/homepage.htm>

BIREME VH Library <http://www.virtualhealthlibrary.org/php/contact.php?lang=en>

CARDIN http://mona.uwi.edu/cardin/virtual_library/searchlibrary.asp

CIMF <http://www.cimfweb.org/>

Disasters info http://www.disaster-info.net/socios_eng.htm

Health Info. Locator

Infomed <http://www.cubasolidarity.net/infomed/www.infomed.sld.cu/indice.html>

CAPHIS <http://www.caphis.mlanet.org/resources/CHISspanish.html>

LANIC <http://www1.lanic.utexas.edu/la/region/health/index.html>

Pan Am Health Org. <http://www.paho.org/>

EurasiaHealth KN <http://www.eurasiahealth.org/index.jsp>

A Guide to Electronic Health Care/Medical <http://lrc.aiha.com/English/Training/LibGuide-Eng.pdf>

Libraries on the Internet

African Index Medicus <http://indexmedicus.afro.who.int/>
BIREME: Database Search
Index Medicus for SE Asia <http://www.who.int/ghl/medicus/en/>
Index Medicus for the Eastern Mediterranean Region (IMEMR) <http://www.emro.who.int/HIS/VHSL/Imemr.htm>
Indian Medlars Centre <http://indmed.nic.in/>
LILACS
pm2mail <http://www.nongnu.org/pm2mail/>
SHARing Point Server <http://www.sharingpoint.net/>
Source Bibliographic Database http://www.asksource.info/res_library.htm
Source Bibliographic Database http://www.asksource.info/res_library.htm
Global Forum for Health Research
COHRED <http://cohred.org/cohred/Home.action>
Medical Research Council of South Africa <http://www.mrc.ac.za/>
SHARED <http://www.shared-global.org/main.asp>
AFRO-NETS <http://www.afronets.org/>
AID Workers Network <http://www.aidworkers.net/>
Child 2015 <http://www.dgroups.org/groups/CHILD2015/>
HIF Net@WHO <http://www.inasp.info/health/hif-net.html>

HIFA2015 <http://www.dgroups.org/groups/HIFA2015/>

HR4D.net <http://www.dgroups.org/groups/HR4D-net/>

ProCOR <http://www.procor.org/>

Telemedicine in Low Resource Settings http://www.dgroups.org/groups/telemedicine/index.cfm?op=main&cat_id=18372

RHINO Listserv <http://www.rhinonet.org/tikiwiki/tiki-index.php?page=RhinoListServ>

Abstracts of Cochrane Reviews <http://www.cochrane.org/reviews/en/>

Telemedicine Research Centre <http://www.mrc.ac.za/telemedicine/telemedicine.htm>

TRIP Database <http://www.tripdatabase.com/>

Helping Health Workers <http://healthwrights.org/books/helpingwlearn.htm>

Hesperian http://www.hesperian.org/publications_download.php

Bireme VH Library <http://www.bireme.br/bvs/I/ihome.htm>

BMJ: Free access <http://www.bmjournals.com/subscriptions/countries.shtml/>

Health InterNetwork Access to Research Initiative <http://www.who.int/hinari/en/>

HighWire <http://highwire.stanford.edu/lists/devecon.dtl>

INASP (PERI) <http://www.inasp.info/peri/index.shtml>

Indian Medlars Centre <http://indmed.nic.in/>

Licensing Resources <http://www.library.yale.edu/~llicense/develop.shtml>

Open Access <http://www.biomedcentral.com/developingcountries/>

pm2mail <http://www.nongnu.org/pm2mail/index.html>

Scientific Electronic Library Online (SCIELO) <http://www.scielo.org/>

Health and Family Planning http://www.usaid.gov/locations/sub-saharan_africa/publications/health.html

HealthLink Bulletin <http://www.hst.org.za/generic/33>

HealthNet News: Publications <http://healthnet.org/publications.php>

Healthlink Worldwide <http://www.healthlink.org.uk/pubs.html>

SciDevNet <http://www.scidev.net/>

Source Database <http://asksource.ids.ac.uk/serials/browseregion.htm>

WHO: Health Topics <http://www.who.int/topics/en/>

WHO: WHOLIS <http://www.who.int/library/database/index.en.shtml>

WHO: Fact Sheets <http://www.who.int/mediacentre/factsheets/>

All Africa <http://allafrica.com/health/>

Eldis/HRC <http://www.eldis.org/health/index.htm>

HealthNet News <http://healthnet.org/publications.php>

Medilinks <http://medilinkz.org/index.asp>

RealhealthNews <http://www.globalforumhealth.org/realhealthnews/RealHealth.php>

World Health News <http://www.worldhealthnews.harvard.edu/>

WHO: Disease Outbreak <http://www.who.int/csr/don/en/>

WHO: WH Reports <http://www.who.int/whr/en/>

AMREF <http://www.amref.org/>

AIHA <http://www.aiha.com/index.jsp>

CDC: Global Health <http://www.cdc.gov/OGH/>

GHI-Net <http://www.ghi-net.org/>

Global Fund to Fight AIDS <http://www.theglobalfund.org/en/>

IGO Search engine (Google) <http://www.google.com/coop/cse?cx=006748068166572874491%3A55ez0c3j3ey>

Hospice Care <http://www.hospicecare.com/contact.htm>

MRC of South Africa <http://www.mrc.ac.za/home.htm>

Equinet <http://www.equinet africa.org/>

PAHO <http://www.paho.org>

PHRplus <http://www.phrplus.org/>

QAProject <http://www.qaproject.org/>

RedR <http://www.redr.org.uk/>

SARA <http://sara.aed.org/>

WADN <http://www.wadn.org/>

WHO <http://www.who.int>

WHO: Africa <http://www.afro.who.int/>

WHO: Europe <http://www.euro.who.int/>

WHO: East Med. <http://www.emro.who.int/index.asp>

WHO: SE Asia <http://w3.whosea.org/index.htm>

WHO: Wesern Pacific <http://www.wpro.who.int/>

Afronets See above

Aliance for Health Policy <http://www.who.int/alliance-hpsr/resources/en/>

Canadian Coalition for Global Health Research <http://www.ccghr.ca/default.cfm?lang=e>

Council on Health Research for Development <http://www.cohred.org/main/>

Council on Health Research for Development See above

Designing and Conductng Health Systems Research Projects http://www.idrc.ca/panasia/ev-33013-201-1-DO_TOPIC.html

Equator Network <http://www.equator-network.org/>

Geneva Foundation for Medical Education and Research http://www.gfmer.ch/000_Homepage_En.htm

Global Forum for Health Research http://www.globalforumhealth.org/Site/000_Home.php

Global Forum for Health Research meetings list See above

HR4D See above

id21 health: Communicating Development Research <http://www.id21.org/health/>

Medical Research Council of South Africa See above

Council on Health Research for Development See above

SciDevNet <http://www.scidev.net/index.cfm?fuseaction=contactus>

SHARED <http://www.shared-global.org/main.asp>

Support for Analysis and Research in Africa <http://sara.aed.org/>

HNP Stats <http://go.worldbank.org/N2N84RDV00>

Medlinks <http://medilinkz.org/index.asp>

UNICEF: Stat Data <http://www.unicef.org/statistics/index.html>

POPIN <http://www.un.org/popin/>

WHO: Evidence and Info <http://www3.who.int/whosis/menu.cfm>

WHOSIS <http://www3.who.int/whosis/menu.cfm>

WHO: Weekly Report <http://www.who.int/wer/en/>

Clip Art for Health Comm. http://www.m-mc.org/mmc_search.php

Photoshare <http://www.photoshare.org>

TDR Image Library http://www-nt.who.int/tropical_diseases/databases/imagelib.pl

Ethnomed <http://www.ethnomed.org/>

Geneva Foundation http://www.gfmer.ch/000_Homepage_En.htm

healthtraining.org <http://www.healthtraining.org/>

Helping Health Workers <http://healthwrights.org/books/helpingwlearn.htm>

Innovative Partnership <http://www.medicine.swan.ac.uk/inthealth.html>

Medical Teaching <http://www.medicalteaching.org/>

tropEd <http://www.troped.de/>

Vital Signs http://www.joannabriggs.edu.au/best_practice/bp8.php#

Health Communication Partnership <http://www.hcpartnership.org/Healthwise/>

Telemedicine in low resource settings <http://www.dgroups.org/groups/telemedicine/>

WHO: Health Informatics http://www.who.int/topics/medical_informatics/en/

Virtual Anesthesia Machine <http://vam.anest.ufl.edu/>

World Anaesthesia Online <http://www.nda.ox.ac.uk/wfsa/>

Public Healthcare Laboratory <http://www.phclab.com/>

Global Cardiovascular Infobase <http://www.cvdinfobase.ca/>

International Heart Health Society <http://www.internationalhearthealth.org>

ProCOR www.ProCOR.org

WHO: Cardiovascular Diseases http://www.who.int/topics/cardiovascular_diseases/en/

World Heart Federation <http://www.world-heart-federation.org/>

World Hypertension League <http://www.worldhypertensionleague.org/Pages/Home.aspx>

Healthwrights <http://healthwrights.org/books/WTINDentistonline.htm>

WHO Oral Health <http://www.whocollab.odont.lu.se/index.html>

Skin Care Nursing <http://www.isng.soton.ac.uk/>

IDF Diabetes e-Atlas <http://www.eatlas.idf.org/>

WHO Diabetes Melitus http://www.who.int/topics/diabetes_mellitus/en/

World Diabetes Foundation <http://www.worlddiabetesfoundation.org/>

Best Practice Guidelines http://www.who.int/surgery/en/ESC_in_disasters.pdf

Emergency Nutrition Network <http://www.enonline.net/>

Harvard Program in Refugee Trauma <http://hpert-cambridge.org/>

Integrated Management <http://www.who.int/surgery/imeesc/en/index.html>

Health Action in Crises <http://www.who.int/hac/en/>

Environmental Health Perspectives <http://www.ehponline.org/>

Global Environment Facility <http://www.gefweb.org/>

Healthy Environments for Children's Alliance <http://www.who.int/heca/en/>

International Federation of Environmental Health <http://www.ifeh.org>

PAHO Environmental Health Topics <http://www.paho.org/selection.asp?SEL=TP&LNG=ENG&CD=CENVHEALTH>

WHO Children's and Environmental Health <http://www.who.int/ceh/en/>

WHO Environmental Health http://www.who.int/topics/environmental_health/en/

ICEH <http://iceh.org.uk/>

Low Vision Gateway <http://www.lowvision.org/>

OptoNews Africa/Vision Care <http://www.ona.kabissa.org/>

Unite for Sight <http://www.uniteforsight.org/>

Enteric Pathogens <http://www.oloep.org/>

AEGIS <http://www.aegis.com/>

AIDS Epidemic Update http://www.unaids.org/epi/2005/doc/report_pdf.asp

BioAfrica <http://bioafrica.mrc.ac.za/>

Census Bureau <http://www.census.gov/ipc/www/hivaidsd.html>

Epidemiological Fact Sheets <http://www.healthnet.org/essential-links/hiv-aidsdatabases-and-statistics.html>

HIV InSite <http://hivinsite.ucsf.edu/InSite.jsp?page=Country>

Synergy Project <http://www.synergyaids.org/summaries.asp>

AIDSMAP <http://www.aidsmap.com/>

Delivering Antiretroviral Therapy <http://www.fhi.org/en/HIVAIDS/pub/Delivering+ART.htm>

EngenderHealth <http://www.engenderhealth.org/>

EngenderHealth: HIV and AIDS <http://www.engenderhealth.org/res/onc/hiv/index.html>

GALEN

AIDS Treatment and Practice <http://www.aidsmap.com/en/main/sitemap.asp>

Living Well with HIV /AIDS

Reproductive Health Outlook http://www.rho.org/html/hiv_aids.htm

Treating HIV & AIDS <http://www.aidsmap.com/en/docs/3F5509B5-BC9C-4C63-9AFD-EDA4EEA3B52E.asp>

AIDS and Culture

WHO: '3by5 Initiative' <http://www.inasp.info/health/links/hivclin.html>

Glossary of Terms <http://www.engenderhealth.org/res/onc/hiv/glossary/index.html>

AF-AIDS <http://archives.hst.org.za/af-aids/>

Fondation du Present <http://www.fdp.org/forums.html>

HealthNet News-AIDS list.healthnet.org/mailman/listinfo/hnn-aids

ProCAARE <http://www.procaare.org/>

ProNutrition <http://www.pronutrition.org/discgroups-hiv.php>

AfroAIDSInfo

UNAIDS http://www.unaids.org/epi/2005/doc/report_pdf.asp

AIDS Resources <http://www.geocities.com/kim1122b/AIDS.html>

AIDS Channel <http://www.aidschannel.org/>

Asian AIDS Resources <http://www.growthhouse.org/asianhiv.html>

Development Gateway: HIV/AIDS <http://topics.developmentgateway.org/hiv>

ELDIS/HRC HIV & AIDS Resource Guide <http://www.eldis.org/hivaids/index.htm>

Gender and AIDS Web Portal <http://www.genderandaids.org/>

HIV InSite <http://hivinsite.ucsf.edu/InSite>

Annotated Bibliography http://www.rho.org/html/hiv_aids_bibliography.htm

IAPAC <http://www.iapac.org/>

Population and Health Information Share <http://www.phishare.org/>

Red Ribbon <http://www.redribbon.co.za/>

Family Health International <http://www.fhi.org/en/index.htm>

African Counseling Network <http://www.geocities.com/kim1122a/>

Family Health International: HIV/AIDS <http://www.fhi.org/en/hivaids/index.htm>

Global AIDS Alliance <http://www.globalaidsalliance.org/>

Global AIDS Program <http://www.cdc.gov/nchstp/od/gap/>

Hope for African Children Initiative <http://www.hopeforafricanchildren.org/>

International AIDS Economics Network <http://www.iaen.org/index.htm>

International AIDS Vaccine Initiative <http://www.iavi.org/>

International HIV/AIDS Alliance <http://www.aidsalliance.org/sw1280.asp>

Regional AIDS Training Network (RATN) <http://www.ratn.org/>

UNAIDS: Upcoming Conferences <http://www.unaids.org/en/events/calendar.asp#>

UNESCO: Action Against AIDS

AIDS Media Center <http://www.aidsmedia.org/>

AIDS Pandemic in the 21st Century <http://www.census.gov/prod/2004pubs/wp02-2.pdf>

AIDSchannel.org <http://www.aidschannel.org/>

AllAfrica.com: AIDS <http://allafrica.com/aids/>

The Communication Initiative: HIV/AIDS section <http://www.comminit.com/hivaids/>

Confronting AIDS: Public Priorities in a Global Epidemic <http://www.worldbank.org/aids-econ/confront/confrontfull/>

Development Gateway: HIV/AIDS <http://topics.developmentgateway.org/hiv>

Family Health International: HIV/AIDS <http://www.fhi.org/en/hivaids/index.htm>

HIV and AIDS Online Minicourse <http://www.engenderhealth.org/res/onc/hiv/index.html>

Integrated Regional Information Networks <http://www.plusnews.org/>

International AIDS Economics Network <http://www.iaen.org/index.htm>

PANOS: HIV/AIDS Reports <http://www.panos.org.uk/resources/reportsection.asp?ID=1001>

Population Council: HIV/AIDS <http://www.popcouncil.org/hivaids/index.html>

Resources for Family Planning and HIV/AIDS Integration <http://www.hivandsrh.org/>

Resource Guide for Sex Educators <http://www.comminit.com/materials/ma2004/materials-115.html>

SciDev.net: HIV/AIDS <http://www.scidev.net/dossiers/index.cfm?fuseaction=dossierItem&Dossier=22>

Sourcebook of HIV/AIDS Prevention Programmes
<http://www.schoolsandhealth.org/Sourcebook/sourcebook%20intro.htm>

Southern Africa AIDS Info. Dissemination Service <http://www.safaids.org.zw/>

WHO: Communicable Disease Surveillance & Response <http://www.who.int/csr/don/en/>

WHO: HIV Infections http://www.who.int/topics/hiv_infections/en/

10/66 Dementia Research Group <http://www.alz.co.uk/1066/>

Harvard Program in Refugee Trauma <http://hprrt-cambridge.org/>

Mental Health Atlas http://www.who.int/mental_health/evidence/atlas/en/

WHO: Mental Health http://www.who.int/mental_health/en/

World Federation for Mental Health <http://www.wfmh.com/>

WHO: Child and Adolescent Health and Development <http://www.who.int/child-adolescent-health/>

WHO: Division of Nutrition for Health and Development <http://www.who.int/nut/>

Iron World Site Map <http://www.micronutrient.org/IDPAS/SiteMap.html>

The Nutrition Society <http://www.nutritionociety.org/>

Standing Committee on Nutrition <http://www.nutritionociety.org/>

Alliance for Cervical Cancer Prevention <http://www.alliance-cxca.org/>

Primary Ear and Hearing Care http://www.who.int/pbd/deafness/activities/hearing_care/en/index.html

BASICS <http://www.basics.org/>

WHO: Child and Adolescent Health and Development <http://www.who.int/child-adolescent-health/>

Child to Child Trust <http://www.child-to-child.org/>

Child 2015 <http://www.dgroups.org/groups/CHILD2015/>

Facts for Life <http://www.unicef.org/ffl/>

Child Health Care Bad link

Childhealth Advocacy International Bad link

International Child Health Group <http://www.ichg.org.uk/>

International Child Health Review Collaboration <http://www.ichrc.org/>

WHO: Child and Adolescent Health and Development <http://www.who.int/child-adolescent-health/>

Perinatal Educational Programme <http://www.pepcourse.co.za/>

Randomized Trials <http://www.ichrc.org/>

Rehydration Project <http://www.rehydrate.org/>

WHO: Child and Adolescent Health and Development <http://www.who.int/child-adolescent-health/>

Alliance for the Prudent Use of Antibiotics (APUA) <http://www.tufts.edu/med/apua/>

Boletin Farmacos <http://www.boletinfarmacos.org/>

Campaign for Access to Essential Medicines <http://www.accessmed-msf.org/index.asp>

essentialdrugs.org <http://www.essentialdrugs.org/index.php>

International Drug Price Indicator Guide

International Network for the Rational Use of Drugs <http://www.inrud.org/>

International Network of Drug Information Centres <http://www.essentialdrugs.org/indices/about.php>

Standard Treatment Guidelines & Essential Drugs Lists <http://www.hst.org.za/publications/52>

WHO: Essential Medicines Library http://mednet3.who.int/eml/eml_intro.asp

WHO: Health Technology and Pharmaceuticals <http://www.who.int/technology/>

African Regional Health Report http://whqlibdoc.who.int/afro/2006/9290231033_rev_eng.pdf

Eldis/HRC Health Resource Guide <http://www.eldis.org/health/index.htm>

Global InfoBase <http://www.who.int/infobase/report.aspx>

Glossary for Evidence Based Public Health <http://jech.bmj.com/cgi/reprint/58/7/538.pdf>

MEASURE Program <http://www.measureprogram.org/>

Verbal Autopsy Standards <http://www.who.int/whosis/mort/verbalautopsystandards/en/>

Caribbean Virtual Disaster Library http://mona.uwi.edu/cardin/virtual_library/searchlibrary.asp

Disasters: Preparedness and Mitigation in the Americas <http://www.paho.org/english/dd/ped/newsletter.htm>

Disasters and Humanitarian Assistance <http://www.paho.org/english/dd/ped/topics.htm>

Disasters info Disastres http://www.disaster-info.net/socios_eng.htm

Disease Control Priorities Project <http://www.dcp2.org/page/main/Home.html>

Epidemic and Pandemic Alert and Response <http://www.who.int/csr/en/>

Global Health eLearning Center Register

Global Health Watch <http://www.ghwatch.org/2005report/ghw.pdf>

GLOBALink <http://www.globalink.org/globdemo/>

Health Library for Disasters <http://www.helid.desastres.net/>

Public Health Care Laboratory <http://www.phclab.com/>

International Clinical Epidemiological Network (INCLIN) <http://www.inclen.org/>

Supercourse: Epidemiology, the Internet and Global Health <http://www.pitt.edu/~super1/>

HealthNet News on Community Health <http://list.healthnet.org/mailman/listinfo/hnn-ch>

Morbidity and Mortality Weekly Report (MMWR) http://www.cdc.gov/mmwr//mmwr_wk.html

Health-E Communication <http://www.comminit.com/healthcomm/>

Materials Media Clearinghouse <http://www.hcpartnership.org/mmc/>

AccessMod (Modeling Physical Access to Health Care) <http://www.who.int/kms/initiatives/accessmod/en/index.html>

Alliance for Health Policy and Systems Research <http://www.alliance-hpsr.org/jahia/Jahia/>

Designing/Conducting Health Systems Research Projects http://www.idrc.ca/panasia/ev-33013-201-1-DO_TOPIC.html

Disease Control Priorities Project <http://www.dcp2.org/main/Home.html>

Effective Health Care Alliance Programme <http://www.liv.ac.uk/lstm/ehcap/introduction.htm>

Human Resources for Health <http://www.hrhresourcecenter.org/>

Health Manager's Toolkit <http://ecu3.msh.org/toolkit/>

Human Resources for Health Dossier <http://www.eldis.org/go/topics/dossiers/human-resources-for-health/>

Innovative Technologies for Health Care Delivery (INTRAH) <http://www.intrah.org/>

International Health Impact Assessment Consortium (IMPACT) <http://www.ihia.org.uk/>

MAKER: Management of Health Services <http://www.who.int/management/intro/en/index.html>

Management Sciences for Health (MSH) <http://erc.msh.org/>

portable Knowledge Assessment Development System <http://pkads.bis.ucc.ie/>

Routine Health Information Network (RHINO) <http://www.rhinonet.org/tikiwiki/tiki-index.php?page=HomePage>

WHO: Health Care Waste Management http://www.healthcarewaste.org/en/115_overview.html

WB: Health, Nutrition, Population

Radiology Education Foundation <http://www.refindia.net/>

Adolescent Reproductive Health Network (ARHNe) <http://www.nutrition.uio.no/ARHNe/>

POPLINE <http://db.jhuccp.org/popinform/basic.html>

Reproductive Health Resources http://www.rho.org/html/rh_resources.htm

United Nations Population Information Network <http://www.un.org/popin/>

Alliance for Cervical Cancer Prevention (ACCP) <http://www.alliance-cxca.org/>

Best Practices Compendium <http://www.advanceafrica.org/compendium/>

A Book for Midwives: Care, Pregnancy and Women's Health http://www.hesperian.org/midwives_chapters.htm

Center for Prenatal Diagnosis <http://www.cpdx.com/>

Comprehensive Reproductive Health and Family Planning Training Curriculum
http://www.pathfind.org/site/PageServer?pagename=Pubs_Training_Curriculum

Engenderhealth www.engenderhealth.org

Geneva Foundation for Medical Education and Research http://www.gfmer.ch/000_Homepage_En.htm

Implementing Best Practices in Reproductive Health <http://www.ibpinitiative.org/>

IntraHealth International <http://www.intrahealth.org/>

Iron World Site Map <http://www.micronutrient.org/IDPAS/SiteMap.html>

JHPIEGO <http://www.jhpiego.org/>

JHU: Center for Communication Programs <http://www.jhuccp.org/>

Maximizing Access and Quality (MAQ): Global Technical Briefs <http://www.maqweb.org/techbriefs/>
Medical Abortion: Facts and info for healthcare professionals <http://www.medicationabortion.org/index.html>
Perinatal Education Programme <http://www.pepcourse.co.za/>
Population Reference Bureau <http://www.prb.org/>
PREMA-EU <http://www.prema-eu.org/>
Repro-ado <http://www.repro-ado.org/index.html>
Reproductive Health and Research <http://www.who.int/reproductive-health/index.htm>
Reproductive Health Online (ReproLine) <http://www.reproline.jhu.edu/>
Reproductive Tract Infections <http://www.rho.org/html/rtis.htm>
ReproLine: Tools for Trainers <http://www.reproline.jhu.edu/english/5tools/5tools.htm>
Sexual Violence Research Initiative <http://www.svri.org/>
Where women have no doctor http://www.hesperian.org/publications_download.php#wwhnd
WHO: Reproductive Health Library <http://www.rhlibrary.com/>
WHO: Sexual and reproductive health resources <http://www.who.int/svri/en/>

HIPNET Listserv <http://www.rhgateway.org/mailman/listinfo/hipnet>

Comprehensive Reproductive Health and Family Planning Training Curriculum
http://www.pathfind.org/site/PageServer?pagename=Pubs_Training_Curriculum

Contraceptive Methods http://www.rho.org/html/contraceptive_methods.htm

Family Health International <http://www.fhi.org/en/index.htm>

Family Planning: A global handbook for providers <http://www.infoforhealth.org/globalhandbook/>

Geneva Foundation for Medical Education and Research <http://www.gfmer.ch/>

Resources for Family Planning and HIV/AIDS Integration <http://www.hivandsrh.org/>

Health and Family Planning Publications (USAID) http://www.usaid.gov/locations/sub-saharan_africa/publications/health.html

Exchange on HIV/AIDS, Sexuality and Gender <http://www.kit.nl/smartsite.shtml?id=ILS>

IPPF Medical Bulletin <http://www.ippf.org/ContentController.aspx?ID=830>

Journal of Health & Population in Developing Countries <http://www.jhpdc.unc.edu/>

Outlook http://www.reproline.jhu.edu/english/3cc/3outlook/outlook_cc.htm

Pop Reporter <http://www.infoforhealth.org/popreporter/>

Reproductive Health Outlook <http://www.rho.org/>

Development Gateway: Population and Reproductive Health <http://topics.developmentgateway.org/population>

Info Project <http://www.infoforhealth.org/>

OneSource Topics <http://www.infoforhealth.org/topics/hierarchy.php>
POPLINE <http://db.jhuccp.org/ics-wpd/popweb/basic.html>
Population and Health Information Share <http://www.phishare.org/>
Reproductive Health Gateway <http://www.rhgateway.org/>
WHO: Reproductive Health and Research <http://www.who.int/reproductive-health/index.htm>

Alliance for Cervical Cancer Prevention (ACCP) <http://www.alliance-cxca.org/404.htm>

Comprehensive Cervical Cancer Control http://www.who.int/reproductive-health/publications/cervical_cancer_gep/index.htm

Reproductive Health Outlook: Cervical Cancer <http://www.rho.org/>

Alan Guttmacher Institute (AGI) <http://www.guttmacher.org/>

Alliance for Cervical Cancer Prevention (ACCP) <http://www.alliance-cxca.org/>

Health Information and Publications Network (HIPNET) <http://www.infoforhealth.org/hipnet/index.shtml>

International Planned Parenthood Federation <http://www.ippf.org/>

Population Council <http://www.popcouncil.org/index.html>

Program for Appropriate Technologies in Health (PATH) <http://www.path.org/>

RAINBO <http://www.rainbo.org/>

United Nations Population Fund (UNFPA) <http://www.unfpa.org/>

Guidelines for Management of Sexually Infections <http://whqlibdoc.who.int/publications/2003/9241546263.pdf>

Reproductive Tract Infections <http://www.rho.org/html/rtis.htm>

Reproductive Tract Infections and Sexually Transmitted Infections, Including AIDS
<http://www.popcouncil.org/ebert/designstisaid.html>

Resource Guide for Sex Educators <http://www.comminit.com/materials/ma2004/materials-115.html>

Sexually Transmitted Diseases and other RTI http://www.popcouncil.org/pdfs/frontiers/reports/RTIS_GEP_FINAL1.pdf

Sexually Transmitted Infections <http://sti.bmjournals.com/>

Sexually Transmitted Infections Online Mini-Course <http://www.engenderhealth.org/res/onc/sti/>

Best Practice Guidelines http://www.who.int/surgery/en/ESC_in_disasters.pdf

Surgical Care at the District Hospital <http://www.who.int/surgery/publications/en/SCDH.pdf>

World Orthopaedic Concern <http://www.worldorthopedicconcern.org/>

National Center for Infectious Diseases, U.S <http://www.cdc.gov/ncidod/index.htm>

Pacific Public Health Surveillance Network <http://www.spc.int/phs/PPHSN/>

WHO: Communicable Disease Surveillance and Response <http://www.who.int/csr/disease/en/>

WHO: Disease Outbreak News <http://www.who.int/csr/don/en/>

Action Against Infection: a Newsletter for WHO and its Partners <http://www.who.int/infectious-disease-news/newsletter/index.html>

Emerging Infectious Diseases <http://www.cdc.gov/ncidod/eid/index.htm>

Illustrated Lecture Notes on Tropical Medicine

La Santé Tropicale sur Internet <http://www.santetropicale.com/>

Hardin MD - Tropical Diseases <http://www.lib.uiowa.edu/hardin/md/tropical.html>

Institute of Tropical Medicine: Links to Selected Websites <http://lib.itg.be/biblinks.htm>

Médecine Topicale <http://www.chu-rouen.fr/ssf/tropfr.html>

Dr. Fungus <http://www.doctorfungus.org/>

International Leprosy Association <http://www.leprosy-ila.org/>

LEPRA (British Leprosy Relief Association) <http://www.lepra.org.uk/home.asp>

TDR: Leprosy <http://www.who.int/tdr/diseases/leprosy/>
WHO: Cholera <http://www.who.int/topics/cholera/en/>
WHO: Elimination of Leprosy as a Public Health Problem <http://www.who.int/lep/>
WHO: Meningococcal Disease <http://www.who.int/csr/disease/meningococcal/en/>

International Laboratory-related resource and Activity Directory <http://wwwn.cdc.gov/dls/ila/>
le site de l'infectiologie française <http://www.infectiologie.com/>
WHO: Disease Outbreak News <http://www.who.int/csr/don/en/>
WHO: Infectious Diseases <http://www.who.int/topics/en/>

APOC <http://www.apoc.bf/>
African trypanosomiasis <http://www.who.int/tdr/diseases/trypp/>
ANOFEL http://www.med.univ-angers.fr/service_serveur/invite/anofel/
Chagas Disease <http://www.who.int/tdr/diseases/chagas/>
Drugs for Neglected Diseases Initiative <http://www.dndi.org/>
Global Alliance to Eliminate Lymphatic Filariasis <http://www.filariasis.org/index.pl>
Health and Development International <http://www.hdi.no/>
Leishmaniasis (TDR) <http://www.who.int/tdr/diseases/leish/>

Lymphatic filariasis (TDR) <http://www.who.int/tdr/diseases/lymphfil/>

La Maladie du Sommeil <http://www.trypano-humaine.com/>

Onchocerciasis (TDR) <http://www.who.int/tdr/diseases/oncho/>

OnchoNet <http://www.science.smith.edu/departments/Biology/SWILLIAM/OnchoNet/OnchoNet.html>

Parasitologie <http://www.chu-rouen.fr/ssf/biol/parasitologie.html>

Parasitology Online <http://pathmicro.med.sc.edu/book/parasit-sta.htm>

Partners for Parasite Control <http://www.who.int/wormcontrol/en/>

Schistosomiasis (TDR) <http://www.who.int/tdr/diseases/schisto/default.htm>

WHO: African Programme for Onchocerciasis <http://www.who.int/pbd/blindness/onchocerciasis/en/>

Occurrences of Ebola <http://www.mcb.uct.ac.za/ebola/ebopage.htm>

Global Polio Eradication Initiative <http://www.polioeradication.org/>

Smallpox and its eradication <http://www.who.int/emc/diseases/smallpox/Smallpoxeradication.html>

WHO: Ebola Haemorrhagic Fever <http://www.who.int/csr/disease/ebola/en/>

WHO: Influenza <http://www.who.int/csr/disease/influenza/en/>

African Malaria Vaccine Network Trust <http://www.amanet-trust.org/>

Asian Collaborative Training Network for Malaria <http://www.actmalaria.net/>

Malaria Foundation International <http://www.malaria.org/>

Multilateral Initiative on Malaria <http://www.mim.su.se/>

PREMA-EU <http://www.prema-eu.org/>

Roll Back Malaria: A Global Partnership <http://www.who.int/malaria/home>

SA Healthinfo: Malaria <http://www.sahealthinfo.org/malaria/malaria.htm>

SciDev.Net: Malaria <http://www.scidev.net/dossiers/index.cfm?fuseaction=dossierItem&Dossier=23>

WHO Division of Control of Tropical Diseases: Malaria <http://www.who.int/topics/malaria/en/>

WHO Malaria Treatment Guidelines 2006 <http://www.who.int/malaria/docs/TreatmentGuidelines2006.pdf>

WHO/TDR Malaria Database <http://www.wehi.edu.au/MalDB-www/who.html>

ASTMH <http://www.astmh.org/>

Institute of Tropical Medicine <http://www.itg.be/itg/GeneralSite/Generalpage.asp>

Institut Pasteur <http://www.pasteur.fr/externe>

London School of Tropical Medicine <http://www.liv.ac.uk/lstm/>

Médecine Tropicale <http://medecinetropicale.free.fr/legal.html>

Royal Society of Tropical Medicine and Hygiene <http://www.rstmh.org/>

Anti-Tuberculosis Drug Resistance in the World <http://www.who.int/tb/en/>

Global Alliance for TB Drug Development <http://www.tballiance.org/>

Health and Development Initiative India <http://www.healthinitiative.org/html/index.htm>

International Union against Tuberculosis and Lung Disease
http://www.iuatld.org/full_picture/fr/frameset/frameset_ns6.phtml

SA HealthInfo: Tuberculosis <http://www.sahealthinfo.org/tb/tb.htm>

Stop TB Partnership <http://www.stoptb.org/>

TB Education & Training Resources <http://www.findtbresources.org/scripts/index.cfm>

TB Training Tools <http://www.healthinitiative.org/html/tbtraining/index.htm>

tb.net-the Global TB Network <http://www.south-asia.com/ngo-tb/Default.htm>

WHO: Global Tuberculosis Program <http://www.who.int/tb/en/>

Arab Resource Collective (ARC) <http://www.mawared.org/>

Association for Health Information and Libraries in Africa (AHILA) <http://www.ahila.org/>

The Communication Initiative <http://www.comminit.com/healthcomm/>

Development Gateway <http://home.developmentgateway.org/>

Digital Dividend Project Clearinghouse <http://wriws1.digitaldividend.org/wri/app/index.jsp>

Directory of Medical Libraries in Africa <http://www.ahila.org/directory.php>

Donation Programs for Books, Journals and Media <http://ublib.buffalo.edu/libraries/units/hsl/donationprograms.html>

Dreyfus Health Foundation <http://www.dhfglobal.org/>

Electronic Publishing Trust for Development (EPT) <http://www.epublishingtrust.org/>

Exchange: a Networking and Learning Programme <http://www.healthcomms.org/>

FreeForAll http://www.geocities.com/wfb_2/freeforall.html

Global Healthcare Information Network <http://www.ghi-net.org/>

Global Health Library <http://www.who.int/ghl/en/>

Handbook for Telecenter Staffs <http://ip.cals.cornell.edu/commdev/handbook.cfm>

Health Communication Materials Network (HCMN) <http://www.hcmn.org/>

Health Information and Health Organizations in Africa <http://www.columbia.edu/cu/lweb/indiv/africa/cuwl/health.html>

Health InterNetwork <http://www.healthinternetwork.org/src/registration.php>

Healthlink Worldwide <http://www.healthlink.org.uk/>

Hesperian Foundation <http://www.hesperian.org/>

HIFA 2015 <http://www.ghi-net.org/campaign/>

How to accelerate your Internet <http://www.bwmo.net/>

Information Management Resource Kit http://www.imarkgroup.org/index_en.asp

Libraries for All: How to Start and Run a Small Library
http://www.unesco.org/webworld/highlights/library_run_020299.html

Licensing Digital Information: Developing Nations Initiatives <http://www.library.yale.edu/~llicense/develop.shtml>

Loband <http://www.apivate.org/Home.html>

Media Materials Clearinghouse (MMC) <http://www.hcpartnership.org/mmc/>

Partnerships In Health Information (Phi) <http://omni.ac.uk/hosted/phi/>

pm2mail <http://pkads.bis.ucc.ie/>

Reproductive Health Outlook:ICTs <http://www.rho.org/html/ict.htm>

Resource Centre Manual, 2nd edition <http://www.healthlink.org.uk/PDFs/resource-centre-manual.pdf>

SatelliteLife <http://www.satellite.org/>

Scientists for Health and Research for Development (SHARED) http://www.nwo.nl/nwohome.nsf/pages/NWOP_5VDE7Q

Source: Support for Resource Centres <http://www.asksource.info/support.htm>

Teaching-aids at Low Cost (TALC) <http://www.talcuk.org/>

World Directory of Medical Libraries <http://www.who.int/ghl/directory/en/>

World Health Report 2006 <http://www.who.int/ghl/directory/en/>

Resources for International Librarians, Health Professionals <http://www.inasp.info/file/641/health-inform.html>

Equator Network <http://www.equator-network.org/>

FAHAMU: Writing for Science and Effective Writing - Core Skills <http://www.fahamu.org/WFCEng/sitemap.html>

Free Medical Information: Doctor=Publisher <http://www.freemedicalinformation.com/freemedicalinformation.pdf>

APPENDIX G: SPSS DATA

Appendix G: SPSS Data

mean	subject	treatment
1.125	1	1
1.1667	1	2
1.5	1	3
1.75	2	1
1.6667	2	2
3.25	2	3
2	3	1
2	3	2
2.5	3	3
2	4	1
2.75	4	2
3.6667	4	3
2.375	5	1
2	5	2
3	5	3
1.8333	6	1
1.6	6	2
2.5	6	3
1.375	7	1
1.6667	7	2
2.75	7	3
2.25	8	1
1.6667	8	2
1.75	8	3

1.875	9	1
2.5	9	2
1.75	9	3
1.875	10	1
2	10	2
2.5	10	3
1.75	11	1
1.8333	11	2
2.5	11	3
1.625	12	1
1.8333	12	2
3	12	3
2.125	13	1
1.6667	13	2
2.5	13	3
1.375	14	1
1.6667	14	2
2.5	14	3
4	15	1
1.6667	15	2
2	15	3
2	16	1
2.3333	16	2
3	16	3
2.375	17	1
2.1667	17	2
2.75	17	3
2.375	18	1

2.6667	18	2
2.5	18	3
1.75	19	1
1.8333	19	2
2.25	19	3
1	20	1
1	20	2
2	20	3
1.625	21	1
1.8333	21	2
2	21	3
1.25	22	1
1.3333	22	2
3	22	3
2.125	23	1
2.3333	23	2
2.75	23	3
1.125	24	1
1.6667	24	2
1.6667	24	3
1.375	25	1
1.3333	25	2
1.5	25	3
1.5	26	1
1.6667	26	2
2	26	3
2	27	1
2.1667	27	2

2.25	27	3
2	28	1
1.6667	28	2
3	28	3
2.5	29	1
1.6667	29	2
2.25	29	3
1	30	1
1	30	2
1	30	3
1.375	31	1
1	31	2
2	31	3
1.625	32	1
2	32	2
2.75	32	3
1.625	33	1
1.5	33	2
2	33	3
2	34	1
2	34	2
2.5	34	3
2.25	35	1
1	35	2
2.75	35	3

APPENDIX H: SPSS RESULTS

Your trial period for this version of SPSS will expire in 14 days.

```
GET
  FILE='/Volumes/EUSTICK/sc.sav'.
DATASET NAME DataSet1 WINDOW=FRONT.
SAVE OUTFILE='/Users/escott/Desktop/Uddin.sav'
  /COMPRESSED.
UNIANOVA mean BY treatment subject
  /RANDOM=subject
  /METHOD=SSTYPE(3)
  /INTERCEPT=INCLUDE
  /POSTHOC=treatment(TUKEY T2)
  /EMMEANS=TABLES(treatment)
  /PRINT=HOMOGENEITY
  /CRITERIA=ALPHA(.05)
  /DESIGN=treatment subject.
```

Univariate Analysis of Variance

[DataSet1] /Users/escott/Desktop/Uddin.sav

Between-Subjects Factors

		N
treatment	1	35
	2	35
	3	35
subject	1	3
	2	3
	3	3
	4	3
	5	3
	6	3
	7	3
	8	3
	9	3
	10	3
	11	3
	12	3
	13	3
	14	3
	15	3
	16	3

Between-Subjects Factors

	N
subject 17	3
18	3
19	3
20	3
21	3
22	3
23	3
24	3
25	3
26	3
27	3
28	3
29	3
30	3
31	3
32	3
33	3
34	3
35	3

Levene's Test of Equality of Error Variances^a

Dependent Variable: mean

F	df1	df2	Sig.
	1	34	

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + treatment + subject

Tests of Between-Subjects Effects

Dependent Variable: mean

Source	Type III Sum of Squares	df	Mean Square
Intercept	418.568	1	418.568
Error	16.184	34	.476 ^a

a. MS(subject)

b. MS(Error)

Tests of Between-Subjects Effects

Dependent Variable:mean

Source		F	Sig.
Intercept	Hypothesis	879.360	.000
	Error		

- a. MS(subject)
- b. MS(Error)

Tests of Between-Subjects Effects

Dependent Variable:mean

Source		Type III Sum of Squares	df	Mean Square
treatment	Hypothesis	8.127	2	4.063
	Error	12.059	68	.177 ^b
subject	Hypothesis	16.184	34	.476
	Error	12.059	68	.177 ^b

- a. MS(subject)
- b. MS(Error)

Tests of Between-Subjects Effects

Dependent Variable:mean

Source		F	Sig.
treatment	Hypothesis	22.913	.000
	Error		
subject	Hypothesis	2.684	.000
	Error		

- a. MS(subject)
- b. MS(Error)

Expected Mean Squares^{a,b}

Source	Variance Component		
	Var(subject)	Var(Error)	Quadratic Term
Intercept	3.000	1.000	Intercept, ...
treatment	.000	1.000	treatment
subject	3.000	1.000	
Error	.000	1.000	

a. For each source, the expected mean square equals the sum of the coefficients in the cells times the variance components, plus a quadratic term involving effects in the Quadratic Term cell.

b. Expected Mean Squares are based on the Type III Sums of Squares.

Estimated Marginal Means

treatment

Dependent Variable: mean

treat ment	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	1.835	.071	1.692	1.977
2	1.767	.071	1.625	1.909
3	2.388	.071	2.246	2.530

Post Hoc Tests

treatment

Multiple Comparisons

Dependent Variable: mean

	(I) treat ment	(J) treat ment	Mean Difference (I- J)	Std. Error	Sig.
Tukey HSD	1	2	.067381	.1006640	.782
		3	-.553571*	.1006640	.000
	2	1	-.067381	.1006640	.782
		3	-.620952*	.1006640	.000

Based on observed means.

The error term is Mean Square(Error) = .177.

*. The mean difference is significant at the .05 level.

Multiple Comparisons

Dependent Variable: mean

	(i) tre...	(j) tre...	95% Confidence Interval	
			Lower Bound	Upper Bound
Tukey HSD	1	2	-.173819	.308581
		3	-.794771	-.312372
	2	1	-.308581	.173819
		3	-.862152	-.379753

Based on observed means.

The error term is Mean Square(Error) = .177.

*. The mean difference is significant at the .05 level.

Multiple Comparisons

Dependent Variable: mean

	(i) treat ment	(j) treat ment	Mean Difference (I-J)	Std. Error	Sig.
Tukey HSD	3	1	.553571*	.1006640	.000
		2	.620952*	.1006640	.000
Tamhane	1	2	.067381	.1210511	.926
		3	-.553571*	.1340694	.000
	2	1	-.067381	.1210511	.926
		3	-.620952*	.1218114	.000
	3	1	.553571*	.1340694	.000
		2	.620952*	.1218114	.000

Based on observed means.

The error term is Mean Square(Error) = .177.

*. The mean difference is significant at the .05 level.

Multiple Comparisons

Dependent Variable: mean

	(i) tre...	(j) tre...	95% Confidence Interval	
			Lower Bound	Upper Bound
Tukey HSD	3	1	.312372	.794771
		2	.379753	.862152
Tamhane	1	2	-.229291	.364053
		3	-.881770	-.225373
	2	1	-.364053	.229291
		3	-.919520	-.322385
	3	1	.225373	.881770
		2	.322385	.919520

Based on observed means.

The error term is Mean Square(Error) = .177.

*. The mean difference is significant at the .05 level.

Homogeneous Subsets

mean

	treat ment	N	Subset	
			1	2
Tukey HSD ^a	2	35	1.767143	
	1	35	1.834524	
	3	35		2.388095
	Sig.		.782	1.000

Means for groups in homogeneous subsets are displayed.

Based on observed means.

The error term is Mean Square(Error) = .177.

a. Uses Harmonic Mean Sample Size = 35.000.

APPENDIX I: IRB CERTIFICATE

Appendix I: IRB Certificate



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901, 407-882-2012 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Notice of Exempt Review Status

From: **UCF Institutional Review Board**
FWA00000351, Exp. 5/07/10, IRB00001138

To: **Edward Scott**

Date: **March 17, 2008**

IRB Number: **SBE-07-05362**

Study Title: **OCTAGON THEORY: THE SHAPE OF CROSS-CULTURAL DESIGN IN PUBLIC HEALTH INFORMATICS**

Dear Researcher:

Your research protocol was reviewed by the IRB Chair on 3/17/2008. Per federal regulations, 45 CFR 46.101, your study has been determined to be **minimal risk for human subjects and exempt** from 45 CFR 46 federal regulations and further IRB review or renewal unless you later wish to add the use of identifiers or change the protocol procedures in a way that might increase risk to participants. Before making any changes to your study, call the IRB office to discuss the changes. **A change which incorporates the use of identifiers may mean the study is no longer exempt, thus requiring the submission of a new application to change the classification to expedited if the risk is still minimal.** Please submit the Termination/Final Report form when the study has been completed. All forms may be completed and submitted online at <https://iris.research.ucf.edu>.

The category for which exempt status has been determined for this protocol is as follows:

2. Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures, or the observation of public behavior, so long as confidentiality is maintained.
 - (i) Information obtained is recorded in such a manner that the subject cannot be identified, directly or through identifiers linked to the subject, **and/or**
 - (ii) Subject's responses, if known outside the research would not reasonably place the subject at risk of criminal or civil liability or be damaging to the subject's financial standing or employability or reputation.

A **waiver of documentation of consent** has been approved for all subjects. Participants do not have to sign a consent form, but the IRB requires that you give participants a copy of the IRB-approved consent form, letter, information sheet, or statement of voluntary consent at the top of the survey.

All data, which may include signed consent form documents, must be retained in a locked file cabinet for a minimum of three years (six if HIPAA applies) past the completion of this research. Any links to the identification of participants should be maintained on a password-protected computer if electronic information is used. Additional requirements may be imposed by your funding agency, your department, or other entities. Access to data is limited to authorized individuals listed as key study personnel.

On behalf of Tracy Dietz, Ph.D., UCF IRB Chair, this letter is signed by:

Signature applied by Janice Turchin on 03/17/2008 02:29:29 PM EST

A handwritten signature in black ink that reads "Janice Turchin".

IRB Coordinator

APPENDIX J: OVERFLOW

Appendix J: Overflow

Text not used in dissertation

First-person Accounts: Healthcare, Culture and Technology in Uganda

Unexpected Diagnosis

The woman sat on a chair in a cramped examination room. Jerome Mugabi, a clinical officer who runs the Kakatunda Health Centre in Bukinda, a town in rural, southwest Uganda, greeted her (Scott, 2007a). As the woman described her ailments, and Mugabi interpreted, Will Cogburn, M.D., an internal medicine specialist from Venice, Fla., learned that she suffered from malnutrition. But since she didn't have malaria, HIV or another chronic disease, they wondered why she didn't eat. After all, food grows readily in Uganda, an East African country located at high, fertile elevations on the Equator. Then Mugabi put the puzzle pieces together. After injuring her shoulder, this poor, subsistence farmer had been unable to cultivate the crops, carry the water or dig the root stock that had been essential to her diet for years.

“She wasn't able to feed herself or her family because she was injured,” Cogburn said. Cogburn says he was not surprised by the diagnosis. He was equally unsurprised by much else he saw when he and a team of seven others — including six from Grace United Methodist Church in Venice — traveled to Uganda for two weeks in July 2007. Cogburn and his family had been to Africa twice before, providing healthcare in Tanzania and Uganda in 2002 and in Rwanda in 2005. But unlike previous trips, this time Cogburn and his wife, Dianne, a licensed nutritionist, made all the arrangements. And this time more than family members were in their care. In addition to son Brian and daughter Megan, the team included the Rev. Tom Derrough and his wife Ginny, of Grace church, Megan's Wheaton College roommate, Miss Parker Gary of Plano, Texas, and this researcher, Edward S. Scott, a doctoral student at the University of Central

Florida. With elementary and secondary schools — plus a Catholic church — all located near the clinic, and lots of adults living nearby, rural Bukinda was an ideal place for Cogburn and the team to work. Cogburn estimates he saw some 520 people over five full days and two half days, far more than the 15 or so patients Mugabi sees on a typical day at the same clinic. More patients came after the church promoted Cogburn's visit on the radio and elsewhere. When Cogburn walked up the hill — from the residence where the team was staying — to the clinic, early on the first day, he saw dozens of people waiting for him. He said a prayer; and he relied on his past experiences and his faith to endure the busy week. “Feeling overwhelmed is the good thing, because that's where God is making me stretch my comfort zone,” said Cogburn, who has practiced medicine in Venice since 1992. “It's not Will Cogburn providing. God is providing.”

Some patients came by bicycle. Most were on foot. One reason for the dramatic influx was the eight large crates of medicine the team carried to Uganda. While health centres are readily accessible for most Ugandans, even for those who must travel by foot, they are not always staffed by medical doctors or stocked with much medicine. Before this trip Cogburn purchased 400 pounds of medicine — valued at approximately \$15,000 — for about \$4,000, from Blessings International, a non-profit organization in Tulsa, Okla. He treated patients who suffered from malaria, asthma and other diseases and conditions, plus those who wanted HIV tests or who suffered from arthritis — “just from the hardship of their lives, as far as all the work they have to do.” All the medicine he prescribed was free to the patients. Cogburn acknowledged that much of the medical care he provided was “throwing a Band-Aid on chronic problems” But the team also was able to “demonstrate the love of Christ. We can't solve their medical problems, their social problems, but we can “show them unconditional love,” Cogburn said.

A Future Clinic

Now, harboring a desire to help solve some of Uganda's medical and social problems, Cogburn, Derrough and the others on the team have decided we want to enlarge our commitment to Uganda and East Africa. We have concluded that we want to form a non-governmental organization to raise money to build a thriving health clinic in Uganda, one where physicians and other highly trained healthcare workers would work, and medication always would be available. No specific details have been finalized. “It seems to be what God would have us to do,” Derrough said. “We still don't know exactly where, how or what type [of facility].” One pervasive problem we could address is continuity of care. Presently patients go from clinic to clinic, seeking appropriate medical care and available medicine. Providing continuity would enable patients to be diagnosed, medicated and (hopefully) cured by health workers in the same clinic. The staff would include both native health workers and American physicians — such as Cogburn — who travel to Africa.

It is a lofty goal, but one the team feels can be achieved over time, with the assistance of — among others — Francis and Bernadette Kahembwe, a Ugandan couple the Cogburns befriended after they housed Francis, a rainforest scientist, when he traveled to Sarasota, Fla., for a conference in 1998. The Kahembwes, who had numerous relatives who died of AIDS, leaving orphaned children, share the team’s desire to build a clinic in Uganda. For Berna, the dream began when she was looking after her sister in an African hospital “and there was no good care. The nurses were “neglecting their patients.” Now, instead of taking a two-week journey, the team and the church are on the verge of making a permanent commitment to enhancing healthcare in Uganda. Cogburn is eager to get started. “That's what I want,” he said. “That's what I've been striving for, for a few years. I've been praying and asking God where he wants me to do that.”

Influence of Ugandan Children

It was supertime after a long, hard day in the hills of Uganda. Most of our group had been working at the Kakatunda Health Centre in Bukinda — a rural village — doctoring about 100 patients and running the makeshift pharmacy (Scott, 2007b). Others had spent time in the nearby city of Kabale buying groceries, running errands and introducing themselves to local health ministry officials. Over a dinner of beans and rice (together, the “complete protein”), cabbage, bananas and pineapple, team member Ginny Derrough of Venice asked the others, “Where did you see Jesus today?” She didn’t mean an actual sighting. She wanted to know where we had seen acts of kindness, special moments when we realized, “This is why I rejected my comfort zone in Venice, and flew to Uganda.”

In America, there is so much wealth and so many daily accomplishments, memorable moments usually require anonymous six-figure financial donations or selfless acts of bravery such as we saw in New Orleans during Hurricane Katrina. But in developing countries such acts need not be grandiose to stand out. Ugandans face many obstacles — poverty, children orphaned by civil war, HIV/AIDS and other diseases — that few of us face in America. In Uganda, a simple act of goodwill, by one person for another, is a reflection of God’s grace. Members of our group had many such moments during our two weeks there, first in Kampala, the capital city, and later in Bukinda. Ginny recalled the scene one morning when a local midwife helped a villager through the difficult birth of her son. The baby was non-responsive for about 10 minutes. Team member Dr. Will Cogburn of Venice assisted in the birth and the baby survived. Ginny’s husband Tom, associate pastor of Grace United Methodist Church in Venice, recalled seeing three boys pushing their elderly grandmother on a bicycle several hundred yards up a steep hill from the main road to the health centre.

Bicycles are the principal mode of transportation in the poor, agricultural community of Bukinda. Those few who have cars often use them as taxis. It was not uncommon to see eight people — most of them strangers — packed into a Toyota Corona sedan for the 15-mile drive from Bukinda to Kabale. For shorter distances, those who cannot ride bicycles must walk everywhere they want to go. My answer to Ginny's question recalled riding in an SUV with our hostess, Bernadette "Berna" Kahembwe. She saw an octogenarian woman who had walked to the clinic and offered her a ride home. I don't think Berna knew the woman. I'm certain it wouldn't have mattered. Then there was Emmanuel, a tall teenage boy who regularly brought us water in large jugs — for cooking, drinking and sponge baths — on his bicycle. When you travel to Africa, tradition holds that you leave with only the clothes on your back. Everything else is donated to your hosts. One evening I saw Emmanuel and asked him to stay so I could give him a pair of boots I had purchased at Target before the trip. I hadn't worn them yet, and they fit him well. Several days later I saw him wearing the boots, which he said he intended to wear especially while playing soccer. Ginny recalled a visit to our Bukinda apartments that week by a village woman. She brought us a passel of fruit, asking nothing in return. Unlike the enterprising fruit peddlers in the city she just wanted to thank us for traveling to Bukinda and operating the clinic, where Dr. Cogburn saw some 500 patients over seven days. "I just thought that was so sweet of her," Ginny recalled.

"Sweet" is a word I would use to describe the four children with whom I passed time one afternoon. All were Berna's relatives — three girls and a boy, each under age 10. These kids, who are among Berna's orphaned nieces and nephews — there are more than a dozen — were tossing a red rubber ball when we drove up to her house. Sensing an extended wait, I started tossing the ball with them. For more than a week I had been waiting for that moment when I

would have an experience that caused me to say, “This is why I rejected my comfort zone in Venice, and flew to Uganda.” But it had been difficult. This was my first time in a foreign country, other than the Bahamas. During my first week in Uganda, as I explored Makerere University and downtown Kampala, I was usually the only white person for many square miles. English is an official language of Uganda, but that only manifests itself in advertising. People mostly speak native languages there. It was difficult to strike up conversations, much less connect with people on a personal level, in urban Kampala. But rural Bukinda was different. Passersby would smile and wave. Many said, “Hello, how are you?” or some other English greeting they had learned in school. Berna’s nieces and nephew did not understand much English. I did not understand Ruchiga, their local language. But somehow we connected with one another, as afternoon wafted into evening. We tossed the ball for more than an hour, trying not to let it hit the ground. We were not always successful, but I taught the kids to say English words after each successful catch. Seeing them catch the ball and hearing them say “Cowabunga!” or “Shazam!” with smiles in their voices, and toss it back, my “moment” began to materialize. They no more understood the meaning of “Cowabunga!” than I knew why I asked them to say it. But on that late afternoon, I knew something special had occurred. Later that night, I took Pastor Tom aside and explained how I had been so busy during the trip that I hadn’t had time to really get to know the people; but that my “moment” had finally occurred. “Now you know you belong,” he said.

A Future Clinic

A team of Florida natives, Will Cogburn, M.D., Tom Derrough, M.Div., and I have traveled twice together to Uganda on medical mission trips and decided we want to enlarge our commitment to Uganda and East Africa. Now, harboring a desire to help solve some of Uganda’s

medical and social problems, we concluded that we want to form a non-governmental organization to raise money to build a thriving health clinic in Uganda, one where physicians and other highly trained health care workers would work, and medication always would be available. No specific details have been finalized. “It seems to be what God would have us to do,” Derrough said. “We still do not know exactly where, how or what type [of facility].” One pervasive problem we could address is continuity of care. Presently patients go from clinic to clinic, seeking appropriate medical care and available medicine. Providing continuity would enable patients to be diagnosed, medicated and (hopefully) cured by health workers in the same clinic. The staff would include both native health workers and American physicians — such as Cogburn — who travel to Africa.

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Pastors, Doctors and a Selfish Prayer

It is 11:40 p.m. on July 17, 2008. I am in the lobby of a hotel in the capital city of a northwest Uganda district (Scott, 2008a; Scott, 2008b) during our second of two trips together to Uganda. The lobby has a floor of red tiles. Two comfortable couches face each other, perpendicular to a 17-inch television. A female worker moves the satellite dish from a European sports network to the Africa Magic Channel, then leaves when her shift ends, and I remain. The acting and camera angles are poor, but I appreciate the ambient noise. Another employee, Palma, 23, walks around the room catching — and picking up off the floor — large bugs that swarmed in — and died — when workers left the front door open. “Have you ever eaten one?” Palma asks. I tell her no and wonder if she has ever eaten raw oysters or sushi.

I am writing on a note pad sheet that Palma provided, the sheet separated from the wood table by a Gideon New Testament Bible published in French and German. I glance at Acts 3, my favorite Bible story, the one in which Petrus and Johannes go to the temple at the hour of prayer. I am eager to adapt successfully during this intercultural experience, and avoid “culture shock,” one of four research areas related to psychological adjustment (Kim, 1989, p. 276, in Asante & Gudykunst, 1989).

The lobby, *sans* air conditioning, boasts a reminder of my Venice, Fla., home, a lizard that clings stealthily to the wall above the door. He moves to a white curtain, no doubt planning to pounce on one of the bugs, if Palma does not get to them first. Another reminder: A glass bottle of Coke (300 ml) is at my side. I am attempting to stay up late. I tell a fellow traveler I am a journalist. “As a journalist, shouldn’t you be at the bar?” he asks. Life in Uganda the past 4 1/2 days has been enlightening. I am on a mission trip with the Rev. Tom Derrough of Grace United Methodist Church in Venice and Will Cogburn, M.D., a Venice physician.

After flying to London's Heathrow Airport, where we were delayed last year by a terrorist incident (a woman with a screwdriver shouted pro-Al-Qaeda statements aboard a British Airways plane), we flew to Entebbe International Airport in Uganda, made famous by a 1976 hijacking and the movie "Raid on Entebbe," about an Israeli rescue attempt that introduced much of the world to then-Ugandan dictator Idi Amin. We loaded our gear on a large shuttle van and drove several hours to Jinja, a drop off point for Lake Victoria, the second largest freshwater lake in the world, after Lake Superior, where we boarded a 40-foot canoe with a small motor. There were 16 of us aboard. The water was rough. As the waves began to whip the boat, a woman to my right was humming a Ugandan hymn. By the time the waves were splashing us, she and a woman to my left were singing hymns at full voice. Though I was wearing a shirt, one of the women put a jacket over my chest to protect me from the onrushing water. This was the first of many kind gestures Ugandan women would bestow on me during our stay at Nalubale island. Halfway through this journey to the island my buttocks were in pain, so I sat in a puddle on the floor to cool off. Will warned me about schistosomiasis, a parasitic disease that one acquires by swimming or playing in affected water. Not to worry. He said it is treatable.

It is my second trip to Uganda with Will and Tom, but our first time to share living quarters. We were "put up" in the grandest hut on the island, which has rugs covering a dirt floor, and dirt walls. The couches and mattresses we lounged on were a temporary testimony to our soft American bums (When we left, they removed the couches and beds.). The islanders sleep on wicker mats. They fish and grow crops — and sell both. They cannot be convinced to eat some of the vegetables they grow. Instead, their diet — and ours for three days — was fried tilapia, sausage, goat, cabbage, potatoes, pineapples and bananas. We were tired after our 38-hour journey from Venice, but determine our hosts would be offended if we do not take tea. Thus

for the first of many moments over the next few days, our hut was visited by important men and hardworking women, who swept the floor almost faster than we could add layers of outside dirt to the inside dirt. But they compensated for the lack of privacy by extending Christian kindness. We were there for a pastoral training seminar Tom organized with Pastor Steven Twase of the capital city of Kampala. Over two days Tom instructed several hundred Pentecostal ministers — and others from Nalubale and neighboring islands, and throughout the Uganda mainland.

Pastor Tom told them to read the Bible, study the Bible and teach the Bible, and not be influenced by anything other than “what God meant” by its passages. Our hosts received Tom well and made Will and me feel welcome. Will had planned to attend the seminar, but when Steven announced that an American doctor, Will, and a Ugandan doctor, Simon Okello, were present, they noticed they were sitting side by side. Over the next two days, Will and Simon treated island-dwelling patients in a makeshift clinic (a hut) along with two health workers who accompanied Simon. One, Blessings, was wearing a beautiful white dress. In America it might have been her wedding day. They treated patients with many illnesses, including a family with small children. Each member of the family has syphilis.

Disappointed that I discovered during my flight that my new lime green Polaroid digital camera came out of the box broken, I borrowed Will’s camera and set about doing my job, shooting photos to prove to our three wives that we were in Uganda. After I took some photos of small children, they started following me around the island, Pied Piper-style. I determined it would be fun to walk a few steps, stop, jump, turn and shoot the kids, who marveled at seeing their images in the viewing screen. They began to yell “Mzungu” (white man) and then English words like “goat” and “baby.” They were directing me on what photos to shoot. After the first day of the seminar ended, a football (soccer) match was played between young male Believers

and Nonbelievers from the island. The Nonbelievers won 2-0, and first-place prize was a new soccer ball they used that I had purchased at Wal-Mart.

When he began the seminar, Tom — speaking through an interpreter — told his audience that we would learn more from them than they would from us. It did not take long. These Ugandans praise God with an enthusiasm not seen in many American churches. With their singing, dancing and chanting, this outpouring earned even more style points than a different group of Ugandan pastors we witnessed during our trip in July 2007. Of the earlier group one American noted that we were experiencing a joyous display that few white people — maybe the Rev. Billy Graham — had ever seen. We videotaped last year's praise session. This year we clapped and counted our blessings for being there. Almost immediately after the seminar ended, both Tom and Steven became ill. Tom contracted a stomach ailment and Steven was felled by an allergic reaction — possibly to some candy provided by his American guests. Will was at the ready and doctored both men back to seafaring health. After two total days on the island we prepared to leave at 8 a.m. the next day. But the boat shoved off at 10. Many Ugandans, especially these fishermen, do not own watches; they do not watch clocks. We'd been told our return boat would have fewer than the 16 passengers that were on the boat that took us to the island. Instead it was a larger canoe with 27 folks aboard.

With calmer seas, our journey back took less time and was safer but I did notice one pastor bailing out the center of the canoe. When I saw the captain use a metal pole to shove a plastic bag into a crack in the floor, I could have worried that we would take on water below my feet, but Blessing's voice soothed me as she sang a hymn. We exited the boat the same way we entered it, on the backs of strong, young men who carried us ashore. The shirts they wore had numbers affixed so we would know whom to tip after we retrieved our luggage. Those of us who

were unaware of the tipping custom were quickly taught it by our carriers. I gave mine 500 Ugandan shillings, roughly 33 cents. We drove back to Kampala to exchange money at a downtown hotel and its opulence reminded me of the expensive vehicles we saw at a grocery store on our first day there. Ugandans have an average per capita income of about \$300, a fact that is made hard to believe by the Land Rovers and BMWs in that lot. I'm told government workers likely own them. We spent one night at the home of Bernadette Kahembwe, our Ugandan sponsor. Her name is on all of our travel documents and she will be responsible if we run afoul of the law. I grabbed a copy of "Silence of the Lambs" and read 50 pages after my first shower in four days. There was no hot water.

Before sunrise, the roving blackouts for which Kampala is known made it difficult for us to pack for a routine one-hour flight aboard a single-engine plane north to Gulu, as we began our quest to find a place to build a health clinic. I asked the pilot how long he had been doing this job and Laurie, a Briton, said it was his first day. Gulu is where Joseph Kony once trained the Lords Resistance Army — young Ugandan boys — to fight and kill. Now Kony is somewhere in nearby Congo, the boys are being deprogrammed and we are visiting Watoto, a Pentecostal church/orphanage near where the fighting occurred. We also visited a Gulu hospital, site of a medical school whose first class of 60 students will graduate in May 2009. I was reminded of Will's twin sons, Mark and Brian, who graduated from Venice High School and the University of Florida and now are enrolled in Florida State University's medical school, and his daughter, Megan, who attends Wheaton College in Illinois and may go to medical school as well. Mark and Brian want to bring a group of their classmates to Uganda next summer, and Will already is formulating plans. The Gulu hospital has many patients, but little staff, and inadequate equipment. There is no X-ray machine but there are two people forming prosthetic limbs, a

remnant of the recent wars in and near this district, which also is near war-torn Sudan. Olivia, a nurse from Birmingham, Ala., who was born in Uganda, joined us on the flight to Gulu. We spent time there talking to Joseph, a Pentecostal pastor, and Christine, a Watoto project manager. Christine, who was educated in Canada, has boundless energy and loves to tell people she was born years ago in the Gulu hospital. Despite the hospital's poor condition, which she acknowledges, she is proud of her homeland and prays that we will build a health clinic in Gulu. "Your prayers have to be objective," she said. "Mine can be selfish."

Internet a Useful Tool

Simon Okello, M.D., who works in the Ssesse islands, located in the Kalangala district of Uganda, has been a medical doctor since 2004. Presently he primarily uses the Internet for personal communication, but he foresees how it could greatly benefit health care services in low-income countries, such as Uganda, in the future ([Personal interview with Okello, 2008a](#)).

"The Internet in this age of globalization has become a key [tool] in information sharing, information collection and information management," Okello said. "In health care delivery we can use the Internet for management of data. We have a lot of data in our health centers. We have data in the community. We have data in our information management systems. So when we have the Internet we can share and manage this data as easily as a click. In a click, information can reach the other end of the earth. So we can use Internet to manage data. We can use Internet to share the same data, if properly managed. When shared, it can be utilized. We can use the same Internet to access information. We can use it to access services. We can use it to share our knowledge and skills. So that is the big role it plays. If it were accessible to us, I believe Africa would have got a better foundation in terms of information. We can use the Internet for follow-up of our clients, follow-up of our services, whether they have reached the right people. We can

use the same Internet to see how information is managed in our communities, [how] our services are utilized in our communities. We also can use the Internet for capacity building [learning capability]. We who are in the health care service delivery can use the Internet to build our capacity, [such as] capacity to do clinical work, capacity to manage our patients, capacity to manage our health services. We can do a lot of learning on the Internet. I can learn from you and you can learn from me. We can view capacity in terms of knowledge and skills. I will have increased my capacity to handle my job right.

“So we can still use the Internet to share the skills, as I say,” Simon continued. “If I have a better skill, I can share it with you on the Internet. That is a very important thing in health care delivery, because the world is changing and things are changing. Diseases are transforming themselves. Management systems are changing. So if we are accessing the Internet, we can share the new skills, the new knowledge; the new kind of technology that is coming on board. Just by a click. So I think the Internet plays a big role, if it is utilized.”

How does Simon use the Internet? “I use the Internet — because of the circumstances that I have — just for sending my casual information. I do not have the time to use it for learning purposes because where I work there is no Internet connections. We are in the remote islands where people mainly do [commercial] fishing. We don’t have electrical power. We just use lower-scale solar panels. We get new information by reading books. I know it is becoming a primitive way of learning now, in this age, because you need to go look around in a library and you get a book to read. Technology is changing every night and every day. So reading books makes you miss a lot. Things that are coming in on board are not always put back in books. So we are trying to get more knowledge by reading books, sometimes listening to talk shows — if

there is anything being discussed on radio — and maybe television, which we can also pick [i.e. access] in our primitive islands. We have a television network we can pick.”

Simon says he was exposed briefly to the personal digital assistant (PDA) project explained below that was coordinated by Fred Kakaire, a staff member at the Makerere University College of Medicine, from which Simon graduated. “We have been taken through it for a short period,” Simon said. “We have never used it, but it can be very beneficial. It’s sharing our information and managing our information.”

Where would one go in Uganda to visit a clinic that makes full use of the Internet? “In Uganda currently, almost every clinic does not really explore the Internet,” he said. “We manage our information on computers but we do not use the Internet. If you took a survey now, you would find that every clinic with information management systems that is built up, is only [able] to manage it at the computer level. They are not using the Internet to manage the information. They don’t share it even using the Internet.” How would he change that? “If we talk about it, if we talk about its need, if we advocate for it, maybe it will take a shorter time. Maybe five years. Maybe currently, because the government is trying to introduce, trying to build up its capacity on IT [information technology], trying to upgrade computers to schools, to health centers, to districts, maybe that will speed up our link to the Internet.”

In what ways does the Internet culture threaten Ugandan culture? “It’s our culture to maintain decency,” he said. “But our culture is being destroyed by the culture of the Internet. Like if I talk about Kampala [the densely-populated capital city]. Most of the people who are using the Internet are using it for pornography, which is against our culture. So I think there are some negative aspects of the Internet, especially to us, who are trying to adopt the technology.

Things like pornography, and Web sites that are obscene, they are ill to our culture. If we can find a way of blocking such Web sites, our country would really positively adopt the Internet. Because I have learned that the Internet can be used to purchase from a business, the Internet can be used for learning purposes, the Internet can be used for sharing information, and many, more other things.”

What about health care sites, which may show culturally objectionable images of human body parts? “That’s where the problem comes,” Simon says. “If they are built for us to learn on, then they should be specifically for us who have an interest in learning the [medical] area, not for everybody, because definitely there are some images and some information that might be cultural negative to us. If they need to design one [health care Web site], it should be made in a way that it is only accessible to them that have an interest in it, so that the other part of the population is kept away from it. I think it would be positive.” One of the items on the questionnaire herein asks Web developers if they believe sites like theirs should require registration.

More Views from Outside

Olivia, a registered nurse from Birmingham, Ala., was born in Uganda. She still visits her homeland, bringing American health workers there on medical mission trips. She says one of the primary obstacles to extensive use of technology in Uganda is poor infrastructure, specifically [poor] availability of electrical power. “And the [poor] strength of the satellites in order to actually access a document” ([Personal interview with Olivia, 2008b](#)). Keith Task was 24 in July 2007 when he was in Kabale, Uganda, working at a World Vision office for the Peace Corps, an intergovernmental organization (IGO). He has a bachelor’s degree in chemical engineering. He had arrived in Uganda in March of 2006, and in Kabale in May of 2006, with training in between. “It’s an experience,” Task said. “You really don’t know what to expect when you sign

up. Things change so much and your expectations change. It's definitely a challenge, especially when you first get here, but it's worth the hardships. I heard before I came over that you learn much more than you give and — me and the other volunteers — we hope that we are contributing, but I can speak for myself, and I have learned so much. It's definitely an experience, sharing different cultures and getting experience through another culture" ([Personal interview with Task, 2007b](#))

Task had not done much traveling before he came to Uganda. "Even the small amount of traveling I did, it's here and there and you don't spend a lot of time in each place. Here you get really absorbed in the culture. I've learned a lot about East Africa, Uganda, and the Bukiga, which is the tribe that I stay with, specifically, and what they are all about; and something I don't think I would have experienced if I had just traveled about on vacation or short term."

How will Task parlay his experiences in the Peace Corps to a successful career in the United States? "I think a large part of it is, here in the Peace Corps, you have to make do with what you have got, and sometimes that is not a lot; even just communications for example, are difficult. To get something done with limited resources, I hope it is going to prove valuable when I go into the work and industrial sector — in chemical engineering — to use what you have, whether it is a little or a lot, to get things done."

Among the surprises Task found in Uganda was the different sense of time, which he attributes to East Africa or Africa, not just Uganda. Being on time for an appointment is a custom not practiced by many Ugandans. "It's not bad," he says. "It's a difference in culture. They say our way of life is bad because we are always rushed. We're stressed. Who is to say what's bad and what's not? It's just different. But that was definitely a surprise."

Ugandans' diet consists of very little meat. Beef is more expensive than goat. Ugandans eat lots of rice, beans, cabbage, bananas, pineapples and potatoes. "Food has not really been a problem," Task said. "I enjoy the food. At first, when you have matooke (steamed green bananas) and posho (made from maize), it was different and sort of bland and very starchy. But you eat it every day and you get used to it and now I like it; I'm sure I'll be missing it when I go back."

Living in southwest Uganda, far from where fighting was reportedly still going on in northern Uganda, in 2007, Task said he always felt safe. "Even up north I believe the situation is getting better, and I think in the future the Peace Corps volunteers are going to expand north. But I have felt no insecurity. Around here [there is some concern about] some rebel fighting in [nearby] Congo and some other rebels up north, like in Kibale [district].

Task says he would definitely recommend the Peace Corps to potential volunteers. "Don't expect and don't think you are going to come over and change the world. Naively I kind of thought that, and I think a lot of Peace Corps volunteers do. But you do the little that you can, and that's good. You are not going to save the world. You do your little piece. But just don't come over here with that expectation. It makes adjusting — and your work — that much more difficult. It's a great experience and I am enjoying myself thoroughly."

Catholic Health Care Center

Father Fred Tushabe, parish priest of a Catholic parish in Bukinda for eight years, says Bukinda parish was created on Oct. 18, 1958. "It is a bit big," Tushabe said ([Personal interview with Fred Tushabe, 2007a](#)). "We have only five priests running it." The Bukinda parish operates 12 schools, 10 primary (like elementary) and two secondary (like high schools)," says Tushabe.

“We have a vocational training school, which is young. And we have a seminary (secondary school). And the other learning institutions are private, even though priests founded them.

There are close to 40,000 Protestants (Anglicans) and 20,000 Catholics in the area, Tushabe said. “We have some Pentecostal churches ... but they have come of recent. And we have also some Muslims, but they are very minor. The Kakatunda Health Centre [on the property] operates under the umbrella of the Catholic Church. It is a religious institution [but] we are in partnership with the government. There are many activities that ... are taking place. We have HIV counseling centers. We have maternity. We have OPD (outpatient department). We have an inpatient department, as you saw it. People here are suffering from different various diseases. Many are suffering from malaria, HIV and AIDS.”

The religious community in Bukinda is concerned about problems related to health care, economics and morality. “The approach of the Catholic Church to man, these days, has been the holistic approach, because we are to look at man physically emotionally, spiritually, economically,” he said. “All have to be put into consideration as a worker, but as a priest, the first thing I do is Mass. In fact, according to our rules we are not supposed to talk even to anybody [each day] until we have celebrated the sacrament of the Eucharist — Mass. After Mass we are involved in the different activities of the church, depending on the programs that we have made. We have monthly programs and daily timetables. We have to follow that. The activities that we are involved in are educational. Sometimes we go for home visitations. Sometimes we visit the sick. Sometimes we visit schools. Sometimes we finish cases in offices. Those are problems; they come to the office for counseling. The church, of course, has created an economic side. Of recent we have been giving out some cows to homes. If a home is given a cow and it

produces another cow, that cow is given to another home, so that it evolves. At the end of the day, we hope to find that each home has a cow; the same way with pigs and seeds.

“The Kabale district is one of the four districts that make Kigeza. We have a problem. This is the most densely populated area in Uganda [among rural districts; not including the cities]. So we don’t have much land. The cows which are given are [for the] purpose of grazing. We don’t graze for meat, but for milk; for home consumption and for sale so that we can get maybe a bit of school fees and maybe some things for home.”

The climate in Bukinda, in southwest Uganda, in July, is dry and breezy on the mountainous equatorial range. But Tushabe says malaria has not yet been wiped out here. “The government, together with the churches, in partnership, they have tried to fight malaria,” he said. “They have tried to give drugs. They have tried to give mosquito nets. They have tried to spray in homes, but we still have pockets of malaria cases. We cannot say that it is out. Sometimes it is the season. At this time July we are not seeing any mosquitoes. But sometimes — especially during the rainy season — mosquitoes come in great numbers. But we have at least been relieved somewhat because of the nets that we have been given, because of the spraying that has been done, because of other ventures of fighting malaria by government and also churches.”

The health clinic where Cogburn and his team worked is an older building on the church campus. Tushabe says the clinic will one day — hopefully soon — be replaced by a newer facility. In fact the bricks for the new facility were being made during the American group’s 2007 visit. The church’s vocational school — which was then operating in church buildings — would move to the old health clinic. Tushabe’s dream for health care services at Bukinda also involves building a modern — by Ugandan standards — hospital on the church property within 20 years.

“You see, the main problem for this place — apart from education — is health,” he said. “When someone is having a healthy life, he lives twice, let me call it. [Tushabe apparently was referring to the average Ugandans’ typical life span of little more than 40 years.] He lives longer. So we see that health facilities must be there. Health education must be there. So we want to make sure the health sector is up more than how it is now. Because we lack many things. We lack buildings. We lack personnel. We lack funds. So we want to make sure these things are put into place for the betterment of the life of our people. This place is trying to come from rural status to town status on the African level. We have educational centers. We have commercial centers. We have demonstrative centers (for NGO projects). We have village towns growing into bigger towns. The more they grow, the more the population. And the more the population, the more the need for a hospital.”

As in the United States, getting a hospital in a community is a gradual process and the community must first show need. Kakatunda, the church’s health clinic in Bukinda, is a Health Centre III. “From there we move to Health Centre IV, then from Health Center IV we go to a hospital,” Tushabe said. A clinical officer (medically trained but not an M.D.) and nurses comprise the typical Health Centre III staff. A health center IV typically has at least one medical doctor. A hospital would be set up to do surgeries, eye clinics “things to do with bones, things to do with pediatrics, all that. We hope to have all that down here.”

Previous medical groups have advertised medicine and brought it to Bukinda to sell it. Cogburn’s group gave it away free. Others have trained the local health workers. Cogburn worked with health workers, caring for some 520 patients. Other foreigners have traveled to Bukinda to work in the health clinic “but not in the way you have come,” Tushabe said of Cogburn’s group. “In my eight years ... we have never seen very great numbers (of patients) as

this one, because of your coming. As you can see in the register, some are coming from very far outside our catchment area. I think this has been brought by two major things: Your commitment and also free treatment. Our people are still poor. They need to be pushed. So when they heard of free treatment ... some people are just rooting in their homes. Some are orphans, total orphans. Some are total widows. They don't have anybody they stay with. Some are completely poor. They don't have what to eat, what to put on. So when they heard of free treatment, that's why they have come in great numbers. So your coming is so, so unique from the history of those who have been coming."

Tushabe advertised Cogburn's visit several ways: Announcements at monthly meetings with leaders of the Catholic churches in the region; letters to neighboring Protestant churches; and an announcement on the radio. "Wherever this radio was reaching, the catchment of this radio [station], everybody had that announcement," he said. "It was not only announced once, but several times." On foot or by bicycle, Tushabe says, the farthest distance a patient likely traveled to the clinic during Cogburn's visit was probably 13 to 14 kilometers (8-8.6 miles). "The majority of these churches [where Ugandans congregate to learn about activities] are not connected to roads so people are forced to travel — to go on foot —walking," Tushabe said.

The Catholic priest said very, very few people in his area — fewer than 5 percent — seek the care of witch doctors. "Because people have been enlightened; people have been instructed," he said. "With religion not condoning that, people are refraining from that. And I do hope, also, on the side of the Protestants, it's like that. This place is practically a Christian community. I cannot deny that people go [to witch doctors], but it is certainly a small percentage. Because you will find it hard to find an un-baptized person. Here people are baptized."

Tushabe says there are many things he'd like Americans to know about Uganda, "especially about our life, our way of living, our condition of living. Because not until they have known our condition of living can they come to help us. Secondly, it's better they know our situation. All spheres of life — our education, our economy, our faith, our morals, our understanding of things, maybe our backwardness, all of our achievements and failures, all our politics — I think they need to know all much about us. They need to know much about us."

After stating that Westerners should learn about Ugandans before they visit the country, Tushabe said, "It is better also to visit us, because [it's] not until they have visited us that they can know us. Because in many cases, this communication through radio, through TV and through e-mails — and other things — may be somewhere faulty. But when you come to the ground, that's when you can come to know about Africa. If an American had never come here, and he comes and goes, the picture changes, because he will go with another picture, completely, not the one he was with. There were some people who — before e-mail was installed in the seminary" who pressed Tushabe via phone calls to respond to their e-mails. They were unaware that the church's only Internet access is in a computer lab at a secondary school, not readily accessible. They also didn't know that bandwidth is poor and e-mail programs like Yahoo! Mail load only after extended waits. Only after visiting Uganda does one appreciate that difference from the West.

Uganda from A-Z

Below is a glossary of English and African terms commonly used in Uganda, that this researcher learned during a July 2007 trip. They are a window to some of the cultural differences between Africa and the West (Scott, 2007c):

A-Airtime (cell phones), avocado (a popular fruit), “Agande!” (“How are you!” in traditional Rukiga language). Amin Dada, Idi (president from 1971-79, deposed).

B-Boda-boda (small motorcycles used as taxis), bananas (matooke; Uganda’s production and consumption of bananas is among the highest in the world). Bundibugyo (Pronounced Boon-dee-boo-joe; a district in western Uganda with a fun name. Bukinda (Pronounced Boo-chin-da; location of a Catholic health clinic).

C-Cabbage — A staple in Ugandans’ diet. But foreigners should be wary of (possibly unwashed) cole slaw.

D-Districts — What Ugandans have instead of states.

E-Equator (runs through Uganda), Entebbe (Ugandan city where an Air France jet was hijacked in 1976), East African Community (the regional intergovernmental organization of Kenya, Uganda, Tanzania, Burundi and Rwanda).

F-Fertile soil (Combines with regular rainfall and moderate climate to ensure agriculture prospers in many regions of Uganda).

G-Goats. Many run through streets and fields. Used for milk or meat. Shepherded mostly by young boys with long sticks.

H-HIV/AIDS. Rate for both men and women has been reduced since 1993, making Uganda a rare AIDS success story in sub-Saharan Africa.

I-Indian merchants. Banished by Idi Amin; now back and prospering.

J-”Jambo.” (Pronounced “Jumbo”). Swahili for “Welcome!” Kenya Airways flight attendants say this.

K-Kampala (Uganda’s capital city), Kabale (pronounced Ka-bar-A; city near Bukinda health clinic).

L- Lugandan (Regional language; spoken in Kampala), Lord's Resistance Army (a rebel army engaged in a civil war against the Ugandan government).

M-Yoweri Museveni (President of Uganda since 1986, had presidential term limits abolished). malaria (mosquito-borne disease that kills between one and three million people — most of them young children — each year in Sub-Saharan Africa, maize (corn).

N-New Vision (Government-sponsored newspaper), Nile Special Lager (African beer).

O-Orphans (Uganda has between 1.5 million-2 million orphans, due to civil war and HIV/AIDS).

P-Peanut sauce, pineapple (Staples in Ugandan diet),

Q-Queen Elizabeth National Park (Uganda's most popular game reserve). Overhunted during Amin regime.

R-Rukiga (Pronounced Ru-chi-ga). Regional language spoken where Catholic health clinic is located).

S-Sorghum (Popular grain crop).

T-Taxi (Vans, sedans, motorcycles and bicycles. They usually have more passengers — or banana passels — than seats).

U-United States of Africa (Idea proposed by Libyan leader Muammar al-Qaddafi to unify Africa as a federation of states such as the United States).

V-Victoria, Lake (Source of the Nile River, borders Uganda).

W-Watoto (Swahili for "children;" name of Ugandan orphanage), World Vision (Non-governmental organization at work in Uganda), witch doctors (traditional healers to whom some Ugandans turn when sick).

X-X-ray machines (Many are needed throughout Uganda).

Y-Yellow fever — viral disease that causes 200,000 illnesses and 30,000 deaths every year in unvaccinated populations.

Z-Zebra crossings (pedestrian walking zones) and speed bumps are being added to streets in Uganda, especially near schools. Uganda has very few lighted traffic signals. Traffic is the top cause (46 percent) of severe injuries among urban children — less than 20 years old — in Uganda. During our group's second trip to Uganda in July 2008, we were driving past a school that had no speed bump when a speeding car hit a boy age 6. Cogburn treated his injuries. ...

Part III: Technology in Low-income Countries

Governments, educators, businesses, non-governmental organizations and individuals all face enormous obstacles in their efforts to bring information and communication technologies (ICTs) to low-income countries. The primary obstacle is cost. "The high cost of computer hardware in Africa has a major impact on the continent's ability to improve networked readiness, as this cost is often the largest component of network startup budgets," El-Sobky (2004) writes. And yet many believe that ICTs are a "new social and economic force in the world economy" (Moyo, 1996, in Anderson et al., 1998).

Governments play the primary role in building a low-income country's technical infrastructure. Obstacles to e-learning in low-income countries are due to a lack of infrastructure, plus poor leadership, the scarcity of local content, copyright issues, cultural challenges and the roles of instructors and learners (El-Sobky). Businesses often are slow to adopt new technologies because to do so requires outlays of cash that are earmarked for other purposes. Non-governmental organizations (NGOs) have great ideas, and dream a lot, but often are cash-poor. Individuals, living on extremely low wages, often without electricity, are not likely to adopt technology in their homes. And yet technological advancements are made — somehow — under

the most difficult of circumstances. In 1996, during the age of the nascent World Wide Web, there were several success stories in the African IT community, most notably banking in Nigeria, air travel in Zimbabwe, software development in Mauritius, and “the development of the HealthNet network in many African countries” (Moyo in Anderson et al.). But not all sectors and all low-income countries are making progress, even now in 2008.

For the Essential Health Web site in this research to accomplish its mission regarding low-income countries, many things must happen. Chiefly, the Web sites linked off this portal must be published online in a manner that is technologically consistent with Internet-ready computers in Africa, Asia, and Latin America. But how can one source-country programmer (or a team thereof) determine the optimal manner in which to build and post a site? The programmer(s) must decide to build the site so that as many people as possible can access it without technical difficulty. With the technology of the Internet changing almost monthly, this is not an easy task. New Web technologies are enticing, but they can serve only to increase the difficulty with which a health worker in Africa, Asia or Latin America accesses the World Wide Web. Developers must achieve the lowest-common denominator in programming.

In 1996, Internet modems in the United States had download speeds that ranged from 14.4 to 28.8 kilobytes per second. Today, cable modems in the United States boast speeds of up to 6 megabytes per second. Residents of low-income countries who use — or seek to use — the Internet no doubt seek newer hardware, better software and faster, inexpensive access speeds. But who will deliver them and how will they be delivered? These questions are the focus of this portion of the literature review.

Internet Access

By 2000, all 54 African countries and territories had public Internet access in their capital cities (Jensen, 2000). Thirty countries had access in secondary towns and 19 had nationwide access. Three countries — Egypt, Uganda and Kenya — had what is euphemistically known as “free” Internet access. Customers pay for it when they pay their phone bills. Six countries had local Internet exchange (peering points): Egypt, Ghana, Kenya, Mozambique, South Africa and Uganda. (Jensen).

Five countries had public Internet access at their airports, including Cameroon, Kenya, Nigeria, South Africa and Zimbabwe. Six countries had hotels with in-room Internet access, including Egypt, Ghana, Mozambique, Nigeria, South Africa and Tanzania. More than 30 countries had GSM mobile phone international roaming. Five countries had national, online E-commerce trade sites: Egypt, Ethiopia, Morocco, South Africa and Tunisia. The stock exchanges of seven African countries were on the Internet: Egypt, Ghana, Kenya, Mauritius, Morocco, Namibia and South Africa. More than a dozen African countries had radio stations that broadcast on the Internet, while four had Webcams — Egypt, Nigeria, Seychelles and South Africa (Jensen, 2000). Six years later, access had increased, but the Internet still was suffering problems in Africa (Jensen, 2006): The majority of African countries had not yet connected to global fiber backbones, which is unfortunate because optic fiber is said to be “the only way” for low-income countries around the world to access low-cost bandwidth. The fiber that has been installed was not done so at competitive prices and business models favor the corporations over the users. For example, a “cable planned for the East coast of Africa (EASSy) which will have a major impact on bandwidth availability in the region, was being developed as a club of mostly state monopoly operators with high prices and low volumes in mind” (Jensen, 2006).

Several organizations are taking the lead in an effort to bring computer hardware and thus Internet connectivity to some of the hardest-to-reach regions of low-income countries. Their goal is “wiring” the youngest generation. With the backing of large companies such as Google, Nicholas Negroponte, founding director of The Media Lab at Massachusetts Institute of Technology, embarked on a project called One Laptop per Child, which hopes to provide low-end laptop computers to people in low-income countries. The key element of this effort is the creation of a laptop that will cost only \$100. They hope governments will “buy them in bulk and turn them over to children who live even in the poorest, most remote areas of the Third World” (Nocera, 2006).

If Negroponte gets his wish, and there someday are hundreds of millions of these machines around the world, it will likely change the way children learn, Nocera writes. But it also will radically change the landscape for computer hardware in general in low-income countries. In Ivory Coast, an affluent West African country (compared to its neighbors), a personal computer cost about \$1,000 in 2002. That is considerably higher than the annual per capita income in a country where the minimum monthly wage is \$40 (Reuters).

Negroponte’s plan was to sell one million laptops — powered by Advanced Micro Devices (AMD) chips — each to governments in seven countries. They were to be manufactured by Quanta Computer. The initial cost was to be \$135 per unit (in March 2007), dropping down to \$50 by 2010. Interestingly, because these computers will be used in areas with little or no electricity, crank handles may power them. Negroponte has critics, most notably executives from Microsoft and Intel, both of whom were being left out of a deal that could turn the worldwide market share for computers upside down. Said Bill Gates, chairman of Microsoft, “Geez, get a decent computer where you can actually read the text and you are not sitting there cranking the

thing while you are trying to type.” The chairman of Intel’s board, Craig R. Barrett, called Negroponte’s laptop a “\$100 gadget” (Nocera). Both have much to lose financially if this project is successful.

The notion of a \$100 computer brought to the forefront the question of what applications should be included in a computer used by people in low-income countries, where access to the Internet, technologically-savvy people (for training and maintenance), and even electricity, is often limited. What kinds of computer hardware and software should be implemented? How shall the connectivity be established: telephone lines, coaxial cable, satellite feeds? Each situation is different and calls for different solutions. These questions are being asked in a low-income world even as, through 2001, less than half of the people in the world had made a telephone call; and significantly fewer had used the Internet. Researchers call this the digital divide. (Jensen and Esterhuysen, 2001).

Rural Telecentres

One way that low-income countries can narrow the digital divide between the people in their urban areas, who have access the Internet, and the people in their rural areas, who may not, is through the introduction of rural telecentres. These centres, which can be founded as either public or private enterprises, often include telephones, facsimile machines, computers with Internet access, printers and other hardware. (Some of these facilities are also used as community centres, police stations or health clinics.) Telecentres are often established and maintained by governments, non-profit organizations (NGOs) or entrepreneurs. They have been opened as private enterprises in countries such as Ghana, Kenya and Senegal, but they also have been funded by organizations such as UNESCO, the ITU, the IDRC and a number of other

international development agencies (Jensen and Esterhuysen).

Disadvantages of Telecentres

Comparing decentralized computer projects like One Computer Per Child (OCPC) with centralized telecentres, one sees disadvantages to both: Projects like One Computer Per Child can suffer from poor user technical skills and lack good user training. Meanwhile, telecentres can offer training. Telecentre officials can finance hardware by charging users nominal fees. But use of the OCPC devices has advantages over telecentres. The most obvious is that users can take their laptops with them wherever they go; most importantly they can be taken home. Further, a problem affecting a telecentre might shut down all of the computers in the facility whereas a problem involving a single machine affects only that machine. To expand on this point, Jensen and Esterhuysen list a number of potential telecentre problems: 1) Computer hardware breaks down; 2) Technical assistance is unreliable; 3) Too many or too few customers; 4) Schedule of open hours not designed to meet the needs of users; 5) Delay or loss of funding; 6) Unreliability of volunteers or paid employees and trainers; 7) Conditions of the telecentre, as it may be too small, too hot or too cold; 8) There may be too many programs scheduled for a small staff to maintain; 9) Staff may have poor customer-service skills; 10) Connections to networks or the Internet may be unreliable on either end; and 11) Users may refuse to follow rules of the centre (Jensen and Esterhuysen).

These authors use the word “unreliable” to describe power supplies (twice), technical assistance, volunteers, telecommunications connections and manual, operated-connected calling. Finally, telecentres in low-income countries, which house equipment valued at thousands of dollars, must be made safe from the threat of burglary as well as safe from the threat of natural

disasters. While the cost of using the equipment can be kept low over time, most telecentres cannot budget to replace hardware and software that wears out before it should. If people in low-income, oral cultures are going to leapfrog over books to computers, their hardware must be maintained properly.

Operating Systems

One question brought up by Nocera is that of which operating system should be used in the \$100 machines. In a world where most computers — and tens of millions of people — use the Windows operating system every day, Negroponte's machines were originally developed with Linux free, open-source operating software. This effort is not a rare case, however. Across the world low-income countries are opting to use Linux rather than Microsoft. The Cuban government, for example, chose Linux in 2005. Others include Brazil, India, South Africa, China, Russia and South Korea. And there are more. They are choosing Linux for several reasons. 1) It is perceived to be less expensive; 2) For political reasons. People in countries that officially disapprove of the American government wish not to be associated with American companies such as Microsoft (Pickoff-White, 2005).

Bandwidth

Aside from increasing the number of computers, and choosing the right operating system for those computers, low-income countries must also increase the bandwidth with which they operate those computers on the Internet. If a computer is like a car on a highway, and the operating system is the car's engine, then bandwidth is the highway itself. How fast the car operates depends chiefly on how smooth a ride it gets on the road. Is it a two-lane dirt road or the Autobahn? How fast a computer operates depends a great deal on the amount of bandwidth with

which it is allowed to operate. Like highways, bandwidth is not cheap. In a report he conducted for the Partnership for Higher Education in Africa, Jensen (2003) calculated that Makerere University paid approximately \$22,000/month for 1.5 Mbps/768 Kbps (in/out) while the University of Ghana paid \$10,000/month for 1 Mbps/512 Kbps. Jensen concluded that African universities outside of South Africa were paying more than \$55,000/month for 4 Mbps inbound and 2 Mbps outbound. “These figures are about 100 times more expensive than equivalent prices in North America or Europe” (Jensen).

The INASP report states that governments could control costs and improve access by opening their telecom markets to competition; academic institutions could work together to negotiate lower bandwidth charges from telecoms and local ISPs could set up Internet exchange points — that route Internet traffic within that country rather than through Europe and North America. INASP also promoted the use of open source software. But as Jensen states, INASP also advocates “a different approach” that emphasizes a caretaker philosophy.

An alternative response is to recognise that ‘bandwidth’ is a valuable institutional resource or asset that needs to be managed, conserved, and shared as effectively as possible. Instead of simply extending computer and network infrastructure, or finding cheaper providers, this approach puts emphasis on ways to control and manage the many hungry Internet applications, uses, and practices that consume bandwidth. Such an approach has technical implications regarding network configuration and management. Suitable policies and guidelines are also needed to encourage proper bandwidth saving behaviour. Most critical, it requires that people with the necessary technical expertise and understanding of users' needs are available to the organisation (Jensen, 2003).

Thus studying how bandwidth is used and then using it more wisely are options when access to low-price bandwidth is not possible.

50 Percent by 2015

In addition to working on the One Laptop Per Child project, the chipmaker AMD also is involved in an initiative to give Internet access to 50 percent of the 6 billion people in the world by 2015. (Advanced Micro Devices, 2008a). The company is working on the assumption that the world's population will be 7.2 billion in 2015. Since January of 2004, AMD has announced business relationships with public and private partners in India, China, Russia, Jamaica, Brazil, Ethiopia, South Africa, Turkey, Mexico and countries in Central America. The company even shipped 400 Personal Internet Communicators to Louisiana, Mississippi and Texas to help evacuees contact friends and family in the wake of Hurricane Katrina (Advanced Micro Devices, 2008b).

Personal Internet Communicators are devices designed by AMD and sold by Radio Shack for \$299. They run on AMD's 366 MHz (low power) Geode GX processor and the Windows CE operating system and are designed to allow users to access the Internet and do basic computing (Duncan, 2005). These machines, which are designed to be supported by a local Internet service provider, include keyboard, mouse, and a pre-installed software suite for "communications, entertainment, and education applications that give users improved communications and opportunities for furthering education" (AMD PIC, 2008c).

AMD's PIC is not universally supported. One respondent to a Digital Trends bulletin board wrote: "eh..i love AMD and all but \$299 that is pretty expensive for a barebones comp with no memory and old processor. now a days you can get refurb AMD Athlon 64 from

emachines for \$399. They should be doing what MIT is doing and creating sub \$100 laptops” (“Andrew” in Duncan, 2005). Of course “Andrew” probably does not have the vantage point of someone who lives in a low-income country.

Other Projects

Intel

Intel introduced WiMAX, which was described as a "rugged" PC for use in low-income countries, at its developer forum in August of 2005. Developers designed this wireless machine to be functional in harsh climates; to work during period of intermittent electricity (via car battery) and to co-exist in an environment caked in dust and overrun by bugs, “allowing for far-flung villagers and mystical Indian hermits to access the Internet from their communities (Magee, 2005).

Intel (2008) describes its “World Ahead Program as “a comprehensive initiative that aims to enhance lives by accelerating access to uncompromised technology for everyone, anywhere in the world by advancing accessibility, connectivity, and education.” The company hopes to invest more than \$1 billion into this project through 2010. Its main goals are to enable wireless broadband PC access for “the world's next billion users” while simultaneously training some 10 million teachers how to utilize technology in education. With this accomplished, they say those teachers could impact one billion students.

Microsoft

Bill Gates, the Microsoft chairman, announced a partnership with the United Nations to bring computer technology and literacy to low-income countries, in January 2004. Gates’ company was to create a \$1 billion fund and “work with the United Nations Development

Program to provide software, computer training and cash to establish computer centres in poor communities” (Australian Associated Press, 2004). Their pilot projects were to be in Egypt, Mozambique and Morocco. Gates made the announcement at a news conference at the World Economic Forum. He said the centres would be equipped with more than just Microsoft products, but he added that his company would support use of software that “is quite popular and happens to belong to Microsoft” (Australian Associated Press, 2004). Representatives from low-income countries welcomed the project. Ahmed Mahmoud Nazif, Egypt's minister of communication and information technology, said that some 500 to 600 centres already had been established in Egypt, and the Microsoft aid supports that effort. “The problem is, it's not just the computers and the phone lines that you need,” he said. “It's what's behind that,” referring to technical support. Mark Malloch Brown, a representative of the United Nations, saw this project as a way to “provide poor communities access to information and services” while simultaneously bypassing “corrupt” governments (Australian Associated Press).

Power

Where electricity is not available, how will computers be powered? Some computers in low-income countries are powered by solar energy. Negroponte designed his computers to be powered with a crank or a pedal. Wind-up computers seem like a novel idea but when you consider that clocks have been wound for centuries, it is not such a new idea after all. They were first introduced into low-income countries during the 1990s. British inventor Trevor Baylis connected a spring generator to an Apple Newton eMate 300, a small computer, in 1997, in front of the conference of Commonwealth Education Ministers in Botswana. One minute of winding resulted in 14 minutes of computer usage (Freeplayenergy.com, 2001). But Negroponte's machines lack both a hard drive and optional software. This, in addition to the need for winding,

has resulted in the project being further derided by Bill Gates. At the Government Leaders Forum in 2006 in suburban Washington, Gates stated that shared-use computers should not be without disks of some type, and their screens should be larger (Techshout.com. 2006). Early personal computers and Apple computers had small screens. Gates would like people in low-income countries to start get computing capabilities at a higher end than Negroponte wants, but that may not be financially feasible.

Technological Differences

Africa

Algeria

There are many technological and political issues that either encourage or hamper the progress of Internet usage in low-income countries in Africa, Asia and Latin America. Algeria is a nation of 32.5 million (primarily) Muslims located south of Spain. Algerians speak Algerian, Arabic and French, in addition to Berber dialects (Goetz, 1996). Nearly 6 percent of Algerians access the Internet (Open Net Initiative, 2007). The Web site Cybercafes.com lists 30 cyber cafes in Algeria. Two thirds of these are in Algiers, the capital city. The Algeria Web Café in Algiers boasts 10 computers available to the public, a printer and a scanner. The setup is said to be “aol friendly” and the staff is said to be friendly as well (Cybercafes, 2008a). Cyberbox, also in Algiers, has 15 computers, a printer, scanner, videoconferencing equipment, and AOL connectivity. Futurenet, located in Algiers, is open 24 hours and boasts 10 computers, a printer, scanner, videoconferencing equipment and is also “AOL-friendly” (Cybercafes, 2008b). One of the factors supporting growth of the Internet in Algeria has been financial assistance from the World Bank. Through the 2000 Telecommunications and Postal Sector Reform Project, Algeria has been able to expand its Internet offerings beyond that of the official government agency, the

Ministry of Post and Telecommunications (MPT). With the loan, according to the World Bank, the government focused on four goals:

- (i) establish a new legal, regulatory, and institutional framework; (ii) implement gradual liberalization of all market segments in the sector; (iii) privatize the main telecommunications operator through a transparent and competitive bidding process; and (iv) elaborate a comprehensive postal development strategy, ensuring the financial viability of the postal operator (World Bank, 2002).

Benin

Bordered by Nigeria on the east, Burkina Faso and Togo to the west, Niger on the north in western Africa, Benin has a population of 8.5 million (CIA Factbook, 2008c). Occasionally non-governmental organizations look into the practicality of improving the information and communication technology (ICT) infrastructure of low-income countries. Such was the case with Benin, which was one of 14 African countries involved in the Acacia Project. The project, which ran from 2001-2005, was conceived to "empower sub-Saharan African communities with the ability to apply ICT [for] their own social and economic development" (Hudson, 2001, p.159 in Ojo, 2005). Three years later, Benin has 150,000 Internet users (including 2,000 broadband subscribers), about 1.7 percent of the population (Internet World, 2008f).

Egypt

Egypt is located in northern Africa, bordered by Israel, Libya, Sudan and two seas. The Egyptian population is 78.8 million (Central Intelligence Agency, 2008f). In an effort to make Internet access available nationwide, in 2001 the Egyptian government gave exclusive dialup phone exchanges to Internet service providers throughout the country, making subscriptions, user

names and passwords unnecessary. Access charges were to be billed to the phone making the call. Each of several hundred ISPs has its own access number. Internet cafes are said to be “available everywhere” in Egypt, at an hourly cost of 15 Egyptian Pounds (US\$ 2.50) (Ashmawy, 2006). Among Arab nations in the Middle East, Egypt has been the most successful at integrating the Internet into citizens’ daily lives. This was accomplished through establishment of the aforementioned private ISPs, which manage the national network. Despite little regulation by the government, however, penetration was only 0.4 percent in early 2000 (El-Nawawy, 2000). Low awareness and lack of education are seen as the two principal reasons for low penetration. Other factors are the poor telecom infrastructure, low computer penetration and the high cost of Internet access (El-Nawawy). Almost a decade later Linkdotnet, an Egyptian ISP claimed to have the fastest internet access in the Middle East, including speeds of up to 8Mbps. (Wade, 2008).

Despite the perception of openness, there are signs of censorship on the Egyptian Net. Contrary to a series of pro-Internet comments made by Egyptian authorities, access to some sites is blocked by the government, including those connected to the Muslim Brotherhood, a large opposition movement, and the al-`Amal (Labor) Party. In some cases the government has detained people for their alleged activities online. Human Rights Watch contends that officials conduct warrant-less monitoring of online communications. It has also been alleged that the “Cairo vice squad” attempted to entrap people who were engaged in consensual and private homosexual conduct through the Internet. Finally, the Egyptian government has passed laws and Penal Code provisions to “criminalize the exercise of freedom of expression, laws whose broad and vague language clearly represent a threat to expression and the exchange of information over the Internet as well” (Human Rights Watch, 2006).

South Africa

Ranked fifth in Africa in population, with 43.7 million people (Internet World, 2008f), South Africa ranks first in Africa and among the top 20 internationally in terms of the number of “Internet nodes” (United Nations Economic Commission on Africa - South Africa, 2008b). (An Internet node is basically a computer that accesses the Internet.) The number of South Africans accessing the Internet is approximately 30 times larger than that of the African nation with the next most Internet use on the continent. There are large-capacity Internet facilities throughout the country. Dial-up Internet access costs about \$10-20 per month (United Nations Economic Commission on Africa - South Africa). Internet users grew in large numbers in the late 1990s. There were 1.82 million users by 1999, or almost 500 users per 10,000 citizens. Typical downloads were 33.6-56 Kbps in the early 2000s, and that was expected to increase as satellite and cable modem use increases. The Internet in South Africa has many uses, among them commercial, government, educational and tourism (United Nations Economic Commission on Africa - South Africa). Lewis (2005) tracked four “Critical Negotiation Issues” regarding the Internet in South Africa: 1) competition between Internet service providers and Internet access providers (who control ISPs’ access to phone lines), 2) telecommunications policy changes, 3) privatization and deregulation; and 4) e-commerce policy. In the 13 years that Lewis tracked, “the Internet in South Africa had reached a level of maturity and development that its pioneers hardly dared dream of. Its users in 2002 numbered more than 3.1 million, serviced by more than 200 competing ISPs, ranging from backyard, shoestring operations to the several commercial giants that dominate the sector (Lewis).

Latin America

Argentina

Bordered on the north by Chile and Paraguay, on the east by Brazil and Uruguay, and on the south and west by Chile, Argentina is a country of nearly 40 million people (Central Intelligence Agency — Argentina, 2008b), Argentina has 16 million Internet users. According to one report, there are “many qualified IT people” in Argentina (American U, 2008a). Science is a primary focus of Argentina’s public school system, and computer science is included in the curriculum. Classes are free even at the university level. This has resulted in the supply of IT workers being more than enough to fulfill the needs of industry (American U). But like a cellular telephone in a rural area, Argentina’s Internet connectivity is porous at best outside the principal city, Buenos Aires. American U. reports that satellite connectivity may solve that problem. Meanwhile, once-high phone rates have decreased, downsizing a huge barrier to increased access, especially for small businesses. But “[b]uying habits take time to change and Argentina still has not caught on to these trends.” The government of Argentina both “understands the power behind expanding the Internet and has enacted various decrees to show solidarity for this movement” (American U, 2008b).

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This country of 107 million (Central Intelligence Agency, 2008j) has the technological advantage of being geographically contiguous to the United States and its Internet growth was somewhat similar to that of the American Internet. Internet users increased in Mexico from 39,000 in 1994 to 3.6 million in 2001, according to a study by Mexico’s regulatory body for the telecommunication’s industry, Cofetel, as reported by Thomasson, Foster and Press (2002). These authors divided the Mexican Internet into four chronological periods: introductory,

developmental, duopoly and competitive. Engineers created the regional backbone and made the first Mexican Internet connections during the introductory period (1989-1993). During this phase most of the users were academicians. The first Mexican institution to have an Internet connection was the Monterrey campus of El Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM), in 1989 (Thomasson, Foster and Press). Others then stepped in and aided academia. The Mexican government paid for the first national backbone during the developmental phase (1994-95), and suddenly Mexican researchers were connected via the Internet to the United States. During the duopoly phase (1996-98), Internet watchers in Mexico saw the need for — and rise of — a commercial component. Thus, with the triumvirate of industry, academia and government in place, the National Technology Network (RTN) was formed. RTN marketed the academic backbone for commercial applications while Mexico's telephone company, Telmex, began marketing backbone provider and ISP services. Telmex became the country's dominant Internet service provider (Thomasson, Foster and Press).

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There are approximately three million Internet users in this oil-rich nation of 25.7 million people, which is bordered by Colombia, Brazil and Guyana (all to the south) and sits on the southern coast of the Caribbean Sea (CIA Venezuela, 2008m). Venezuela reached 10.5 million mobile and 3.6 million fixed-line subscribers in 2005. This includes a 16.2 percent growth in subscribers during the third quarter of that year. Internet connections increased 37 percent (to 571,940) during that quarter alone (ZD-Net, 2008). CANTV Servicios was Venezuela's largest ISP at the turn of the century, reaching about 40 percent of the country's then 170,000 Internet users. Partnering with Microsoft, it hoped to increase its Internet services, adding high-speed access, wireless connectivity, electronic commerce, and online banking "to every home and

business in Venezuela” (Microsoft, 1999).

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Asia

China

In 2005 there were more people in China (1.2 billion) than there were Internet users in the world (1 billion) (Computer Industry Almanac, 2006). China is the world’s most-populous country (Central Intelligence Agency — China, 2008x). It has 119.7 million Internet users, second only to the United States. China, which has 11 percent of the world’s Internet users, and where 10 percent of its residents use the Internet (Computer Industry Almanac, 2006), is “embracing the Internet enthusiastically” and the allure of it is “immense” (Cullen and Choy, 1999). And yet despite the advantages it has as a world superpower, China remains a developing country (Wei, 2002) controlled by a Communist government, as Cullen and Choy state:

Although Marxism, as an economic doctrine, is largely a spent force in China, Leninism is alive and well. It remains the keystone of political structure theory in the People's Republic of China (PRC). A fundamental tenant of Leninism is the requirement that the state must control the media. The metaphor often used is that

the media must be both the "throat and tongue" and "the eyes and ears" of the party (Cullen and Choy).

Nearly half of China's Internet users have broadband access (Open Net Initiative, 2005) compared to about eight percent (15.5 million out of 200 million) in the United States (Brown, 2006), although it is true that there may be many different definitions of broadband, just as there are many definitions of other common computer terms such as multimedia.

Even with so many people having fast-access Internet, the government still attempts to be the "eyes and ears." It still wants to filter the content its people view. From 2002 to 2004 a large number of people were detained or sent to prison for "[I]nternet-related offences." The number increased by 60 percent in 2003 alone. One of the offenses for which many people were detained was disseminating information about Severe Acute Respiratory Syndrome (SARS) over the Internet (Amnesty International). Internet access was also limited during the 2008 Summer Olympics in Beijing.

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were to be equipped with telephones, facsimile machines, computers and the Internet (World Bank, 2001). The Philippine government encourages growth in the IT sector by “improving access and inviting increased foreign investment in the domestic market” according to the World Bank. Additionally, the government strives to improve the Internet skills of its population, the report says. To that end, the government has partnered with multinational corporations such as Cisco, Hewlett Packard, Microsoft, and others on the development of ICT training centers. “Today the Philippines has one of the best training infrastructures for ICTs in Asia” (World Bank).

Personal digital assistants (PDAs) are increasingly gaining acceptance as important tools in healthcare in low-income countries. In a project proposal, the IDRC noted the success of the SATELLIFE PDA Project in Africa from 2001 to 2002 as well as the successful use of mobile phones in India. The goal of the proposed project was to take what was learned in those projects and apply it to the Philippines. The project managers hoped to be the first to “develop a graphical user interface for a mobile telehealth system using Symbian and Java over SMS (Simple Messaging System).” A health survey form and electronic patient records were to be included in the system, in addition to a “localized searchable onboard health information reference.” Users were to utilize multimedia-equipped mobile phones, which were chosen instead of PDAs because they have more communication functions and are better for exchanging data. Cost was another factor. Cell phones were less expensive than phone-equipped PDAs (Asia-Pacific Development Information Programme, 2005).

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market, everything from grabbing a piece of the outsourcing pie to supplying manufactured goods and food to the United States and elsewhere” (Jones, 2006). This country of 84 million is located south of China, east of Laos and Cambodia, west of the Gulf of Tonkin and north of the South China Sea (Central Intelligence Agency — Vietnam, 2008x). Some 1.3 million Vietnamese people access the Internet in Vietnam, a country where that act may be scrutinized by government. In November of 2002, Le Chi Quang, a 32-year-old lawyer and Vietnamese dissident was convicted of " 'acts of propaganda' " against the Vietnamese government and sentenced to four years in prison. At the same time the government blocked one ISP's access to the Web site of the British Broadcasting Corporation (British Broadcasting Corporation, 2002). In May of 2004, it was reported that the Vietnamese government had set up rules by which Web surfers were to abide. Attempting to crack down on dissent, the government began requiring that personal identification information be given at the Internet cafes where citizens accessed the Web. Additionally, according to the newspaper run by the Ministry of Public Security, all Internet activity would be tracked. (Associated Press, 2004).

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Technological Differences

Africa

Algeria

There are many technological and political issues that either encourage or hamper the progress of Internet usage in low-income countries in Africa, Asia and Latin America. Algeria is a nation of 32.5 million, primarily Muslims, located south of Spain. Algerians speak Algerian, Arabic and French, in addition to Berber dialects (Goetz, 1996). Nearly 6 percent of Algerians access the Internet (Open Net Initiative, 2007). The Web site Cybercafes.com lists 30 cyber cafes in Algeria. Two thirds of these are in Algiers, the capital city. The Algeria Web Café in Algiers boasts 10 computers available to the public, a printer and a scanner. The setup is said to be “aol friendly” and the staff is said to be friendly as well (Cybercafes, 2008a). Cyberbox, also in Algiers, has 15 computers, a printer, scanner, videoconferencing equipment, and AOL connectivity. Futurenet, located in Algiers, is open 24 hours and boasts 10 computers, a printer, scanner, videoconferencing equipment and also is “AOL-friendly” (Cybercafes, 2008b). One of the factors supporting growth of the Internet in Algeria has been financial assistance from the World Bank. Through the 2000 Telecommunications and Postal Sector Reform Project, Algeria was able to expand its Internet offerings beyond that of the official government agency, the Ministry of Post and Telecommunications (MPT). With the loan, according to the World Bank, the government focused on four goals:

- (i) establish a new legal, regulatory, and institutional framework; (ii) implement gradual liberalization of all market segments in the sector; (iii) privatize the main telecommunications operator through a transparent and competitive bidding process; and (iv) elaborate a comprehensive postal development strategy, ensuring the financial viability of the postal operator (World Bank, 2002).

Benin

Bordered by Nigeria on the east, Burkina Faso and Togo to the west, Niger on the north in western Africa, Benin has a population of 8.5 million ([CIA Factbook, 2008c](#)). Occasionally non-governmental organizations look into the practicality of improving the information and communication technology (ICT) infrastructure of low-income countries. Such was the case with Benin, which was one of 14 African countries involved in the Acacia Project. The project, which ran from 2001-2005, was conceived to “empower sub-Saharan African communities with the ability to apply ICT [for] their own social and economic development” ([Hudson, 2001, p.159 in Ojo, 2005](#)). Three years later, Benin has 150,000 Internet users (including 2,000 broadband subscribers), about 1.7 percent of the population ([Internet World, 2008g](#)).

Egypt

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HealthNet and Uganda

Technology provided by the Academy for Educational Development/SATELLIFE enables health care professionals to participate in global “electronic conferences.” Subscribers receive hard-to-obtain medical information such as library bulletins and publications. An electronic publication published by SATELLIFE “summarizes the latest medical research relevant to the developing world.” Additionally, indirect access to databases in the U.S. National Library of Medicine is provided to subscribers ([International Development Research Centre 1998, March](#)).

IDRC makes the bold claim that HealthNet “saves lives,” particularly in isolated areas. The author cites an example wherein a physician in Zambia was caring for a patient with “an unusual condition.” The physician used HealthNet to e-mail colleagues at a Zambian teaching hospital. His colleagues replied with a treatment that enabled the patient to recover without making the arduous trip to the city where the hospital is located. Meanwhile, at the Muhimbili Medical Centre in Dar es Salaam, Tanzania, physicians stymied the death rate among pediatric burn patients with the help of HealthNet. Again the technology was e-mail. It enabled doctors at the center to share data with their colleagues, including specialists and health organizations worldwide. Free shipments of a drug that helps heal burns and relieves pain were sent by at least one correspondent.

Through AED/SATELLIFE, HealthNet links libraries in low-income (south) African countries with those in the developed north. Among the benefits: north officials train south librarians and provide full-text and summarized articles. Over the years Africa has experienced a variety of epidemics, from HIV to malaria to cholera. HealthNet enables health workers to access health information quickly during an epidemic. SATELLIFE has an electronic conferencing system called ProMED, which includes monitored e-mail discussion groups. HealthNet is affordable for most health workers and the organizations they work for.

IDRC also has been involved in Uganda (located in east Africa), which has experienced deadly epidemics of cholera, malaria and HIV/AIDS. Their plan was to “link Mulago Referral Hospital with rural hospitals and clinics, telecentres, and medical research institutions in Canada and other foreign countries” ([International Development Research Centre, 2002](#)). Access was to be through a high-speed local area network. This would benefit medical students and health workers. It also would benefit local and rural hospitals, as faculty and hospital staff would be

able to provide them with valuable medical information. Researchers were keenly interested in the effectiveness of the “mechanism” or delivery technology in this project (International Development Research Centre, 2002).

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Asia

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commerce component that included a direct payment system. The Vietnamese government had a master plan that pushed for a 10-fold increase in the number of Internet users to between four and five percent by 2005. To get there, government agencies deregulated the management of Internet services ([British Broadcasting Corporation via Newsedge, 2003](#)).

The present research began as a survey about health communication and evolved to include an examination of communication theory, specifically how any subject matter can be plugged into a new communication theory model in a way that makes sense in 2009. The impetus was a presentation at the University of Central Florida in which the speaker — UCF philosophy professor Jennifer K. Mundale, Ph.D. — made connections between cognitive psychology and philosophy. The next step in the present study became to find connections between health communication and communication theory.

Another example: Upon reading a draft letter written to health workers, a proofreader suggests that the sender “write more like a journalist not a PHD candidate.” Prominent textual styles include academic, advertising-oriented, journalistic, poetic, political, public relations-oriented, religious and romantic. Here is another list of just a few textual styles — or genres — with the sub-genres that emanate from them:

Journalism — entertainment, explanation, persuasion

Music — country, jazz, opera

Poetry — sonnet, elegy, ode

Scriptwriting — action, adventure, comedy

Technical communication — international technical writing, medical writing

Other Uses for the Digital Research Cycle

In addition to helping explain how communication works, the digital research cycle is a tool to improve one's digital literacy. It has both vertical and horizontal utility. In other words, in addition to explaining many facets of the narrow area of the communication process, it also serves a broad array of other functions. When someone wants to promote a new product in the Information age, he must first ask questions. When someone wants to do graphic design, he must first study the task before him. When a person wants to conduct academic research or teach, he must first consider variables that are different now than they were 20 years ago, such as online classes and online publication. We live in a global economy. Consumers have access to more information about their product choices than ever before. Marketers have to be at least as smart as their potential buyers. It also is true that Web developers in the Information age must know more than how to create a Web site with the latest sophisticated code and graphics. Having a sophisticated design will not always mean that that site will be the most viewed. It might be the most ostracized. Graphic designers must also consider other digital mediums that they might use to convey a message. Successful implementation of a Web site includes consideration of the four important elements of that field: textual style, technology, subject matter, and audience. Is the subject matter accurate, and in the correct language for the target audience? Is it written in the correct style for the audience? Does it display clearly online for users with slow Internet connections? Is it usable?

Meanwhile, what are the implications to academia of expanding online course offerings and reducing face-to-face courses? [Stafford \(1997\)](#) recognizes the trend but is not encouraged.

There is a revolution erupting in American higher education, and it is called technological restructuring. Personal desktop computing, on-line services, data banks, and high-speed global networking magnetically draw students not into mortar and brick

ivied walls but into virtual classes, or even into full-degree programs transmitted electronically. Wireless technology and digital imagery have made long-distance, off-campus learning a reality. Moreover, this fundamental pedagogical transformation is coupled to a growing sense that doctoral programs individually are producing too many PH.D.s, and a grudging acknowledgement that we have generated too many graduate programs given the paucity of openings (Stafford, pp. 126-127).

What are the implications of more online classes? What are the implications of more and more academic work being published online before being printed in hardcopy journals, or being online only? The fact that the University of Central Florida now encourages the taking of online courses and publishes its dissertations online-only makes the question inevitable. The digital research cycle can help answer questions about how to do it properly.

Here are some examples of how the digital research cycle can be used to aid marketing in the Information age. Solar energy devices, the movie “Blair Witch Project” and Ebooks are examples of products marketed primarily on the Web. Beneva Florist in Sarasota, Fla., sends text messages to its customers to remind them of holidays. And of course buying pizza will never be the same. That is because Pizza.net, based in Delray Beach, Fla., is a “pizza-ordering search engine that lists more than 62,000 restaurants in its vendor database. [The] company maintains its own unique IM [instant messaging] server that can handle thousands of simultaneous users” (Alderton, 2007). Restaurants come and go, as do online-only businesses. Finding a good combination of product (subject matter), customers (audience), communication infrastructure (technology) and advertising (textual style) will not make the pizza taste better but it will at least give the business a chance to succeed.

The digital research cycle also can be used to aid personal communications. In this case, the key is how to transmit information. Which Internet tool is better suited for the subject matter: e-mail, instant messaging, text messaging, Internet radio, online chat, file transfer (FTP), streaming media, Internet telephony, a bulletin board service or hypertext transfer (the World Wide Web)? The emergence of Web-based greeting “cards” makes the latter option viable. Using the digital research cycle one can match his audience and his content with an appropriate technology and, finally, an appropriate textual style. Meanwhile, online courses are becoming more common at American colleges and universities. They are even being offered across oceans as distance education courses. But there are implications of doing this and the digital research cycle can help professors create courses that match the subject matter with their audience, the “technology” or distribution method and the textual style of the field of study. Just as one would not expect teachers to teach engineering the same as they would teach humanities in the classroom, one would hope that they would teach those courses differently online as well. Those are extreme examples, but even when the choices are fairly similar, the digital research cycle can help illuminate the differences. As for the publishing of academic papers online, this subject will be debated at universities for years, but its future as a viable tool seems assured. The digital research cycle can help those who create online journals match their subject matter with their audience, the “technology” or distribution method and the textual style of the field of study.

A student writing a paper to be posted in a paperless environment can use the digital research cycle to help him plan. The same is true for a professor preparing an online course and a graphic designer who is planning a Web site or a marketer planning a Web-based promotional campaign for her product. All can use the digital research cycle to plan their respective projects. Researchers studying how to diffuse an innovation — such as solar energy in a low-income

country — also can use it. All one has to do is plot the relevant variables on the digital research cycle.

The key questions regard how the four communication variables work in combination. How would one successfully write — and publish online — an academic paper about health care for health workers in low-income African countries? How would one successfully write a journalistic article online about the stock market for PDA-owning day traders in Atlanta? How would one convey technical information about Final Cut Pro software to Japanese college students in a manual published in Japanese on a DVD? How would one successfully advertise laundry soap on e-mail ads that are spam-mailed to Internet nodes in Mexico? The senders of each message — or the norms of their respective industry, employer or culture — define success. Anyone attempting to send a complex message could first compose a mental map of the key elements of the process and then draw a concept map, which is a “graphical representation” of the structure of the message (Dagan, 2005). The digital research cycle is one such concept map.

Because of the digital research cycle’s relevance to Web searches, it also is a useful tool for teaching, learning, and research. Teachers can use it to explain to visual learners how to see and make connections between two topics. Students can use it to narrow the subject of a term paper (advertising textual style + automobile subject matter = the advertising of automobiles). The digital research cycle provides educators with a lifetime of research, because the topics that make up the four primary variables have infinite combinations.

Here are two more hypothetical scenarios: 1) The United States Army seeks to win the hearts and minds of Iraqis in 2009 by giving each adult citizen a wireless PDA. The PDA receives daily text messages from the U.S. government, written in English. Hypothetical scenario

2: The U.S. Army, stationed in Camp Zama, Japan, seeks to win the hearts and minds of the Japanese in 2009 by giving each adult citizen a free Smartphone that receives daily e-mail from the U.S. government, written in Japanese. To what degree do these campaigns succeed? The digital research cycle would help predict the success of the textual style and the “technology” or distribution method working to convey information about a subject to a specific audience. Most likely the Japanese scenario would be more successful because the native language is used. But the only way to find out is through research.

HIV/AIDS

Sexually transmitted diseases are a major issue as well. STDs and cervical cancer combine to wreak havoc on families in some low-income countries. According to the World Health Organization (WHO), 14 million adults and 1 million children around the world have become infected with HIV. Of these people, some 80 percent live in sub-Saharan Africa. Where one is treated is an issue. [Temmerman \(2003\)](#) writes that while primary health care facilities are not equipped to treat female reproductive system issues, these women may also be loathe to visit “overcrowded” clinics that treat STDs. Women in low-income countries are specifically vulnerable to STDs for reasons cited by Temmerman: “STDs have high incidence and prevalence rates; STDs have a major impact on health, particularly in women and neonates; STDs facilitate HIV transmission; women often are asymptomatic; access to health care is limited; [and because] the need for services far exceeds available prevention and treatment facilities.”

Data Collection in Tanzania

While neonates in low-income countries are specifically susceptible to STDs, children have died of many causes in Tanzania (Pepall, 2003, October). During the 1990s, there were on average about 35 deaths per 1,000 children annually in the Morogoro district of Tanzania. Children were susceptible to malaria, pneumonia, diarrhea, measles and malnutrition. Adults also were susceptible to disease; particularly malaria and alarmingly — women were susceptible to malaria in pregnancy. Seeking to lower the mortality rate — particularly among children — the Tanzania Ministry of Health and the International Development Resource Centre (IDRC) joined forces and established the Tanzania Essential Health Interventions Project. From 1996-2003, project organizers worked diligently to hone processes such as planning, priority setting and resource allocation in Morogoro, one of Tanzania’s 129 districts. Some 520,000 people live in Morogoro, an agriculture-based district located below the Uluguru Mountains. They are served by “97 widely dispersed [health] facilities” (Pepall). As a result of the program, which will be described below, the number of deaths of children younger than five dropped to around 20 per thousand in 2003, at the program’s end. The key to TEHIP was the collection and proper utilization of data. The data, as provided by the Ministry of Health, enabled researchers to plan health interventions and to calculate their degree of success. TEHIP represented a paradigm shift for health workers in Tanzania. Rather than privileging the status quo, or making decisions based on the agendas of politicians or development agencies, health workers were empowered to “set priorities and allocate their health care resources based on local sources of evidence” such as knowing which diseases caused the most illnesses and deaths — at both the household and community levels. As the program progressed, the district’s health system improved, including level of service “and the use of health interventions” (Pepall).

Uganda

The 1.5 million residents of the Raiai District of southern Uganda endure many of the same illnesses and medical maladies as other Africans, including AIDS and malaria. Many of the health workers there endure the same occupational obstacles as Veronica Ndagire Herman, a certified midwife who treats patients with “all sorts of illnesses,” not just childbirth (Fuchs, 2005). She and her five colleagues work in an environment that does not have electricity or running water, very little use of cellular telephony — Global System for Mobile Communications (GSM) — and scant daily newspapers. But thanks to the project mentioned above, initiated by several non-governmental organizations (NGO), including the International Development Research Centre (IDRC), SATELLIFE and Uganda Chartered HealthNet (UCH), she and 206 other health workers in the district received personal digital assistants (PDAs), with which they can access medical and health information through wireless technology (Fuchs).

With the PDA, a Palm Pilot, Herman can access the district health surveillance report and download medical information to help her treat her patients. Additionally, when Herman denotes health care trends in her region, such as cholera outbreaks, she can transmit data to the district office, which will send medication and personnel accordingly. Prior to having the Palm Pilot, she might wait six months for a response from the district. Some 80 percent of her paper reports never reached the district office. Those were either “lost or damaged by weather en route” (Fuchs). But the PDA also serves a social function. So many people want to use it to access news of current events that she has to monitor the battery’s charge. Twice a week she must travel almost seven miles — on foot or bicycle — to the location where batteries are charged, because she lacks a \$40 solar charger.

Another project involving IDRC and Uganda, or more specifically the Uganda Health Information Network (UHIN), concerned creating a low-bandwidth information network for

health workers in the Mbale and Rakai districts of Uganda. Health workers began using inexpensive personal digital assistants (PDAs) and a cellular telephone network and “cut costs and improved the quality and availability of health information. Its success demonstrates that PDAs can be used to establish an interactive infrastructure in regions serviced only by GSM (Global System for Mobile Communications) telephone networks” ([International Development Resource Centre, 2005](#)). IDRC asks a critical first-step question:

Using technology to more effectively collect and share health information has helped many countries allocate resources more efficiently and, ultimately, give more people access to better quality health care, especially in rural and remote areas. *But how can under-resourced countries build information systems to improve health care when existing communications services are expensive and of poor quality?* UHIN is helping to answer this critical question. (Emphasis added) (International Development Research Centre, 2005).

Often in low-income countries health workers need to access health information quickly, but it is unattainable. Medical researchers and others, primarily in government and at NGO, who are monitoring health trends, also need quick access to medical information. The primary problem is “poor communication infrastructure, economic conditions or disasters” (International Development Resource Centre, 1998, March). First responders to natural disasters can now rely on technology to bring about what U.S. State Department spokesman Adam Ereli called “a new kind of diplomacy” when describing the world’s reaction to the 2004 tsunamis. Among the technologies employed for tsunami relief and “virtual diplomacy” (Ratzman, 2005) were e-mail and teleconferencing, according to Under Secretary of State for Political Affairs Marc Grossman (Wolfson, 2005). For long-range health communication, low-income countries have turned to “a

reliable, inexpensive health information system called HealthNet” (International Development Research Centre, 2003).

The HealthNet network provides medical information to health care providers in more than 30 countries (including 22 in Africa; see Uganda, above). This program, which receives some funding from IDRC, utilizes “radio and telephone-based computer networks and a low-earth-orbit satellite” to transmit medical information from developed countries to low-income countries, and enables target countries to send data back to source countries. Health officials receive information at any of eight ground stations in seven countries at least four times a day. From there, it is sent to doctors’ offices or research institutions (International Development Research Centre, 2003). The process that HealthNet uses is called “store and forward.” In this satellite-based “system” data is transferred more slowly than it would be on the Internet. However, the cost is less than that more conventional method, which benefits low-income countries. The non-profit organization AED/SATELLIFE runs the program. AED/SATELLIFE’S mission is to improve communications “in the fields of public health, medicine, and the environment” (International Development Research Centre, 2003).

Afghanistan

The town of Pada in the Badghis Province in remote northwestern Afghanistan is the site of a “comprehensive” health clinic established and “handed over” by World Vision in 2004. Pada elders, whose community had endured poverty, unrest and drought, lauded World Vision’s efforts. Dr. Will Pascua, who supervised the clinic project, was reported by World Vision to have stated that “ ‘[Badghis] has one of the highest mortality rates in terms of reproductive health. It was one of the highest affected during the drought ... We chose the location because of the

remoteness.’ ” Pascua reported that they learned by conducting a survey that before the health clinic was opened, any of the district’s 39,000 residents would have to travel by donkey for eight hours to a hospital. “ ‘People were so thankful that they had a proper clinic that they could go to for consultation,’ ” Pascua reportedly told World Vision (ReliefWeb, 2004). When World Vision exited, the clinic was taken over by a German non-governmental organization called Malteser, which began running it with assistance from the Afghani Ministry of Health. World Vision reportedly also was working to improve health care in other regions of Afghanistan. For one project they built six clinics in the Ghor province. World Vision also helped improve health care in the Heart province. Among its projects were “midwife training, community health and pharmaceutical donations” (ReliefWeb, 2004).

Chad

According to two studies, malnutrition rates in N’Djamena, Chad, “were as high as 8.5–10.3 [percent] among children aged 6 months to 5 years” (Ministère de la Santé Publique, 1989). Mothers of malnourished Chadian children participated in focus group discussions that had four goals. Facilitators hoped to learn what the women knew — or thought they knew — about malnutrition. They also sought to gather data on interactions between the women and health care workers. They hoped to learn why many of these women stopped seeking health care services after a certain period of time. Finally, they planned to offer methods for improving the use of these “nutritional rehabilitation services” by the women (Wyss and Nandjingar, 2008). Many of the mothers believed that diarrhea and vomiting were “the principle [sic] causes of malnutrition” (Wyss and Nandjingar, 2008). Two items not mentioned frequently as “important elements of health” were quality and quantity of food. Some other factors in malnutrition they did mention included “repeated pregnancies, bitter milk, teething, inflammation of the uvula, and measles;

witchcraft and evil spirits also were implicated. Mothers chose multiple treatment options, and often used both ‘traditional’ and ‘modern’ health care, either in parallel or consecutively” (Wyss and Nandjingar).

India

According to IDRC, in some cultures children are more likely to express their feelings openly than their parents. Further, children may be better educated than their parents and many children are charged with caring for their siblings. IDRC denotes these points as an introduction to a paper on children who are given responsibility for being “agents of change” regarding health care in low-income countries. This “Child-to-Child” process involves children learning about health and hygiene and then sharing what they learn with other children, including both siblings and others in the community (International Development Research Centre, 2003).

This approach was tried in India and several other low-income countries, beginning in 1979, coinciding with the International Year of the Child. Below are a few of the methods used: Young “mini-doctors” take younger children to health clinics where, supervised by health workers, they check their young friends for scabies and communicate the “importance of cleanliness.” Mobile crèches are daycare centers set up at parents’ job sites where caregivers teach health and nutrition to small children. Finally, by 1990 some 180 schools in Bombay and New Delhi were teaching “Child-to-Child” health care practices. IDRC states that it has received “positive evaluation reports” for various “Child-to-Child” projects. The Child-to-Child approach is now being used in more than 90 countries (International Development Research Centre, 2003). Data is being gathered and placed in a copyright-free world information network.

Meanwhile, libraries in India are “dismal places.” Few books are new. Those that are new are stolen by staff members or hidden by students (Wyatt, 1996). Wyatt, director of the Indian Science Documentation Centre, adds that libraries ought to be “reorganized.” He advocates retiring old books, especially those that are “really out of date.” In their place would be a “small collection of useful books and journals which could be more easily monitored.” He advocates non-circulation or one-day circulation of the remaining books, and although he says fines should be assessed for late return, he doubts such a system could be enforced. Wyatt stated that although organizations such as the World Health Organization and the Appropriate Health Resources and Technologies Action Group (AHRTAG) “produce free booklets and newsletters which contain information about immunisations, child-health, AIDS, essential drugs, etc,” he had only once seen them in a library in a low-income country. They were locked in a cabinet in the library office. They had never been opened, much less catalogued.

Kenya

There are 341 people per physician in the United States. That seems like a large ratio until one considers that there are (on average) 10,150 people per physician in Kenya. That number is more alarming in rural Kenya, where some areas have more than 100,000 people per doctor (Selke, n.d.). There are too few health care professionals and medicine is lacking. But a group is hoping to affect change. An organization called Outreach Kenya Development Volunteers set up a health education center and clinic in Kabula. “From our first hand experiences we have seen unsuccessful development projects that failed due to the donor organization’s unwillingness to work with the local people. Therefore, to promote sustainable development, we will assist the current infrastructure by working hand in hand with the local

health care providers in a mutually beneficial exchange” (Selke). Their style was to be “non-imposing,” their clinic was to be maintained by local residents, not outsiders.

Cultural Critical Studies

During World War II, newspapers published the Puzzle of the Five Pigs — which was similar to a combination of a Rubric’s Cube and paper doll cutouts — wherein children cut an image of four pigs, facing each other, each in its own quadrant, cutting the paper into six pieces and then rearranging the pieces into the fifth pig — a mug shot of Adolph Hitler (Rausch, 2008). During the 1950s, newspapers printed anti-Communist propaganda. During the 1950s and 1960s, Southern newspapers covered the Civil Rights Movement from the perspective of the white establishment (Minor, 2005). In each case, the media took the position of the elite. Similar forces were at work during the 2000s as some in the “objective” media promoted the War in Iraq as a noble cause. The World War II and Cold War examples may seem appropriate today, but they may have been controversial during their era of publication.

CCS

Some say the mass media and the cultural elite are involved in an unwitting alliance to inflict their ideology on the rest of society (Lane, Cultural, 2001c). The media do not exist in a vacuum, no matter how much they would like others to believe so. They “are dominated by the prevailing ideology, and they therefore treat opposing views from within the frame of the dominant ideology, which has the effect of defining opposing groups as ‘fringe’ “ (Littlejohn and Foss, p. 325). In studying this phenomenon, cultural studies researchers reveal how the media promotes these ideologies fervently. They also study ways for oppressed groups to resist the “system of power” (p. 326).

Geert Hofstede

By one formulation, each medical Web site can be designed one of three ways. The Essential Health gateway consists of all three, syndrome (i.e. Impact Malaria), anatomy (Where there is no Dentist) and culture/geography (Pan America Health Organization). Many of the Web sites linked off Essential Health were designed in one (powerful, developed) country, such as the United States or the United Kingdom, to be viewed by health workers in another (less powerful, low-income) country, such as Uganda. An important ingredient in the source country's success (as defined by increasing site traffic) is recognition of and paying homage to the cultural differences it has with the target country. Why is this important? Every day English-speaking Web surfers have millions of English-primary Web pages from which to choose. Under such circumstances, it is easy to dismiss the millions of pages written in languages other than English. Countries where English is the primary language comprise only eight percent of the world's population. However it was predicted that by 2005, some 75 percent of Internet users worldwide would be non- English speakers (Marcus in Smith and Salvendy, 2001a). Europe may have a common market and currency, but it boasts 11 major languages. Some 80 percent of European Web sites are designed to accommodate English speakers as well as those who speak some other language.

In many cases, companies and organizations that do business successfully on the Web are those who realize the value of designing sites that attract and keep customers from other countries. Other businesses have been formed around the notion that they can support their clients by helping them create such sites. Languatech, for example, is a British translation firm that strives to create culturally sensitive Web sites (Languatech, 2008).

A usable Web site that has high-quality content still must have a well-designed — and appropriately designed — user interface, if it is to be adopted by people in target countries/cultures. Organizations seeking to disseminate information digitally across cultures should adhere to standards set by experts in intercultural communication, such as Hofstede, an oft-cited theorist on national cultures (Cameron, 2002). Both Hoft and Marcus (2000) cite Hofstede’s work at International Business Machines (IBM) offices in 53 countries, which included a survey that primarily looks at employees’ personal values regarding their work situation ...” (Hoft, 1995, Pp. 85-86) and describes a typology of five variables that affect behavior: power distance, individualism vs. collectivism, masculinity vs. femininity, uncertainty avoidance and long-term orientation.

Power Distance

Power distance is the extent to which people accept large or small levels of power difference in social hierarchies. Power distance occurs when members of a culture deem a “degree of inequality” acceptable (Marcus (2001; McFarland, 1999). The word “distance” refers to differences in levels of power, not physical distance. On Hofstede’s scale, Arab countries, which have patriarchal family structures, score high (80) on the power distance index. Both the leaders and the followers in Arab countries — whether they are in government, business or families — expect both leaders and followers to remain steadfast in their roles, with little chance for change in who plays the dominant (power) role. Germany scores 35 on the power distance index. Austria scores 11 on the scale. America has a score of 40 (ClearlyCultural.com, 2008). A message communicated on a Web site, written by a person from a developed (source) country with a low power index, would need to be written in a manner compatible with the

communication style of recipient health workers in low-income (target) countries with high power indexes.

One of the factors that determine whether a culture has a high power distance index is the income gap between the rich and the poor. Another is how much a country's citizens believe in the virtue of equality. The income gap is wide in Arab countries, where oil has made some people very wealthy but where many people are poor. Comparing a country's PDI to its income inequality to test Hofstede's model (Table 1) shows that income equality plays a role in determining PDI, but the correlation is not 1:1 at either the top or the bottom of the index. Because the lists were made at different times by different organizations, the comparison is problematic. A Wikipedia list of countries by income equality lists 124 countries, measured by the Gini Index using data provided by the United Nations. Simultaneously on the Web, ClearlyCultural.com lists 66 countries on Hofstede's power distance index. Table 1 shows how eight countries that score high on PDI score on IER (with the countries by name, their PDI, their PDI/66 countries on list, their income equality rank [IER], their IER/66 countries on the list and a proportion that represents a ratio of PDI/IER).

Table 1

How Eight Countries Who Score High on PDI Also Score on Income Inequality

<u>Country</u>	<u>PDI</u>	<u>PDI/66</u>	<u>IER</u>	<u>IER/124</u>	<u>PDI/IER</u>
Malaysia	66	1	99	0.798387097	1.252525253
Guatemala	65	0.984848485	118	0.951612903	1.034925526
Panama	64	0.96969697	111	0.89516129	1.083265083
Philippines	63	0.954545455	90	0.725806452	1.315151515

Mexico	62	0.939393939	109	0.879032258	1.068668335
Venezuela	61	0.924242424	98	0.790322581	1.169449598
China (w/ HK)	60	0.909090909	83	0.669354839	1.358159912
<u>Egypt</u>	<u>59</u>	<u>0.893939394</u>	<u>44</u>	<u>0.35483871</u>	<u>2.519283747</u>

PDI: Power Distance Index IER=Income Equality Rank

Countries with the lower proportions in Table 1 (Guatemala, Panama, Mexico) have high PDI and high-income inequality. Countries with higher proportions have higher PDI and lower relative IER (Philippines, China, Egypt). Table 2 shows how 10 countries that score low on PDI score on IER (with the countries by name, their PDI, their PDI/66 countries on list, their income equality rank (IER), their IER/124 countries on the list and a proportion that represents a ratio of PDI/IER.

Table 2

How 10 Countries Who Score Low on PDI Also Score on Income Inequality

<u>Country</u>	<u>PDI</u>	<u>PDI/66</u>	<u>IER</u>	<u>IER/124</u>	<u>PDI/IER</u>
UK	10	0.151515152	51	0.411290323	0.36838978
Switzerland	9	0.136363636	37	0.298387097	0.457002457
Finland	8	0.121212121	10	0.080645161	1.503030303
Norway	7	0.106060606	6	0.048387097	2.191919192
Sweden	6	0.090909091	3	0.024193548	3.757575758
Ireland	5	0.075757576	50	0.403225806	0.187878788
New Zealand	4	0.060606061	53	0.427419355	0.141795312
Denmark	3	0.045454545	1	0.008064516	5.636363636
Israel	2	0.03030303	49	0.39516129	0.07668522
<u>Austria</u>	<u>1</u>	<u>0.015151515</u>	<u>19</u>	<u>0.153225806</u>	<u>0.098883573</u>

PDI: Power Distance Index IER=Income Equality Rank

Table 2 shows that some countries (Denmark, Sweden and Norway) that score high on PDI score relatively lower on IER while some countries (Israel, Austria, New Zealand) that score low on PDI score relatively high on IER. Research shows that the income disparity between the world's richest 20 percent and poorest 20 percent widened from 30:1 in 1960 to 74:1 in 1997 (People's Daily Online, 2001). But power distance is not always an indicator of income inequality.

Individualism vs. Collectivism

This concerns the preference for individual or group achievements. Unlike collectivists, who think of themselves first as members of groups, individualists are loosely bound — or not bound — to groupthink (Marcus (2001; McFarland, 1999). On a macro level, this debate is capitalism versus communism. The debate also exists on a micro level, however, regarding how we make decisions every day. The terms individualism and collectivism are mutually exclusive. Do we think of ourselves first, or our group? Da Cunha (2008) writes about a “collectivist ethical principle,” that man does not exist merely to please himself. He has a responsibility to help “others” reach their goals. However the nature of the “others” that can be helped can vary from good influences like family members to bad influences such as dictators. Da Cunha writes that, regardless of the situation, “Man in principle must be sacrificed for others.” In contrast to collectivists, individualists believe in personal freedom. This concept can prove troublesome in a health care situation, where the common good is paramount. But as Lewis (2005) writes, “Collective judgment of new ideas is so often wrong that it is arguable that progress depends on individuals being free to back their own judgment despite collective disapproval” (Freedom Keys, 2008).

To some, health care in collectivist low-income countries would seem to be better than health care in individualist low-income countries. Some collectivist cultures, such as China and Cuba, are collectivist socially but dictatorial politically. Health workers in Communist or dictator-led countries may face difficulty following instructions on a Western health-related Web site if the text goes against the teachings of the government in power or if it has been censored by the government in power. In another scenario, if the urge to secure personal freedom is too strong, a health worker or a patient may reject the “collective judgment” of health workers that have researched a subject — cancer, for example — and determined ways to suppress the disease or treat it. This leads to patients seeking — and physicians delivering — alternative medicine treatments.

Masculinity vs. Femininity

This refers to how much a culture differentiates the roles of men and women. Certain values and qualities are associated with masculinity and others are associated with femininity (Marcus (2001; McFarland, 1999). A comparison of these two concepts centers not on gender roles but rather on how cultures are distinct. People (both men and women) in masculine cultures are generalized to be ambitious. They see issues like computer programming: through an array of binary (yes/no) responses. They privilege large and fast over small and slow. People in these cultures do not work to live; they live to work. Additionally, they place high value on individuals who have accomplished large tasks. (Those are the people they aspire to emulate.) By contrast, men and women who reside in feminine cultures privilege their quality of life. They believe that helping others is very important. The purpose of working, they believe, is merely to earn money to survive, not to purchase more “things.” Business deals in feminine cultures are conducted in such a manner that people look for consensus first. Sympathy for other people is encouraged

(Hofmann, 2008).

There are other characteristics of masculine cultures, in addition to wealth and achievement: Conflict resolution options include war; and the roles of men and women differ in war. Other characteristics of feminine cultures, in addition to emphasis on family, include: conflict resolution through negotiation; equality of positions for men and women; and professionals will work to live rather than live to work. It is important to not confuse masculine and feminine cultures with gender roles within a culture. For example, in 2006 the American media portrayed the United States as a freer and more open society than Arab states such as Iran, Iraq and Saudi Arabia. Equality among the sexes is encouraged, promoted to a great extent in America. We are taught that that is not the case in the latter countries. However, Hofstede's formulation gives the United States a score of 65 on masculinity, whereas Iraq and Saudi Arabia score 52, Iran scores 43. While Middle Eastern countries are portrayed as privileging men, their scores show them to be feminine countries on this scale. Perhaps different terminology would have been more appropriate (Kwintessential, 2008).

Uncertainty Avoidance

This refers to how much a culture disdains uncertainty and the degree to which a culture is uncomfortable with uncertainty and searches for truth; how far a culture will go to avoid uncertainty, anxiety (Marcus, 2001; McFarland, 1999). It is related to theories above that focus on uncertainty. Generally speaking, people in some cultures tolerate ambiguity; they embrace uncertainty within that society better than others. In other words, they do not falter in unstructured situations. People in countries with a high uncertainty avoidance ranking have little tolerance for ambiguity and uncertainty. Leaders in these cultures establish laws, rules and

regulations for people to follow and the citizenry complies willingly. Countries with a low uncertainty avoidance ranking are not as concerned about preventing ambiguity and uncertainty. These societies are freer, more open, in terms of communication. Opinions are encouraged. There are fewer rules. Change and risk taking are welcome (ITIM International, 2008). In weak uncertainty avoidance societies, health workers using the Web to learn about treatments and cures might feel comfortable in unstructured learning situations with vague objectives, broad assignments and no timetables. One would hope that physicians and other health workers from these societies would overcome this seemingly important obstacle to good patient care. While countries can be labeled as high or low, individuals' uncertainty avoidance fluctuates. Individual health workers may prosper if they adopt the traits of high uncertainty avoidance societies, where health workers might be "rewarded for accuracy in problem solving" (University of Washington, 2008).

Long Term Time Orientation

This concept represents a culture's orientation to "Confucian thought, which emphasizes patience" (Marcus (2001). China and other Asian countries score high on long-term orientation, which indicates a society's time perspective and an attitude of persevering. People in these cultures overcome obstacles with time, if not with will and strength (ITIM International, 2008). Hofstede proposes these long-term and short-term orientation traits (Table 3):

Table 3

Hofstede's Traits of Long-term and Short-term Orientation.

Long-term Orientation — (High Score)

Emphasis on persistence

Relationships ordered by status
Personal adaptability important
Face considerations common but seen as a weakness
Leisure time not too important
Save, be thrifty
Invest in real estate
Relationships and market position important
Good or evil depends on circumstances

Short-term Orientation (Low Score)

Emphasis on quick results
Status not a major issue in relationships
Personal steadfastness and stability important
Protection of one's face is important
Leisure time important
Spend
Invest in mutual funds
Bottom line important

Belief in absolutes about good and evil

Source: Tidwell, 2008

Health workers in low-income countries would hopefully not be generalizable and would have positive characteristics of both orientations.

Low-Income Countries on Hofstede

Hofstede’s indices include analyses of low-income countries in East Africa and West Africa, as well as the “Arab World” and various low-income countries in Central and South America. This section will analyze the scores those countries received.

Table 4

How Arab States Score on Hofstede’s Indices

<u>Country</u>	<u>PDI</u>	<u>IDV</u>	<u>MAS</u>	<u>UAI</u>	<u>LTO</u>
Egypt	80	38	52	68	--
Iraq	80	38	52	68	--
Kuwait	80	38	52	68	--
Lebanon	80	38	52	68	--
Libya	80	38	52	68	--
Saudi Arabia	80	38	52	68	--
<u>UAE</u>	<u>80</u>	<u>38</u>	<u>52</u>	<u>68</u>	<u>--</u>

PDI: Power Distance Index. IDV: Individualism vs. Collectivism.
 MAS: Masculinity vs. Femininity. UAI: Uncertainty Avoidance.
 LTO: Long-term Orientation

Source: Clearly Cultural.com

Hofstede’s research confirmed that the Muslim religion plays a significant role in the lives of the people in seven (of 20) Arab states, including Egypt, Iraq, Kuwait, Lebanon, Libya, Saudi Arabia, and the United Arab Emirates. These countries have identical scores (Table 4). They score high on power distance index (80) and uncertainty avoidance (68). These countries generally exist as caste systems, where those who are not powerful or wealthy are not likely to ever become so (ITIM International, 2008). These Arab states score 52 on the masculinity index, which is slightly higher than the average score for all countries or regions measured by Hofstede. It seems a contradiction that Arab women would score at the same level as women in democratic

countries on this scale, while having limited rights. However, this “may be due more to [the] Muslim religion rather than a cultural paradigm” (ITIM International, 2008). The Arab nations score lowest on individualism (38), and compare starkly to a much-higher world average (68). They are primarily collectivist states, a fact indicated by a desire for “a close long-term commitment to the member ‘group’, such as being in a family, extended family, or extended relationships. Loyalty in a collectivist culture is paramount, and overrides most other societal rules” (ITIM International, 2008).

Hofstede makes observations about specific countries in his book, *Cultures and Organizations: Software of the Mind*. Below is cultural information about Egypt, one of the Arab/African countries he studied:

Egypt — Like Libya, Egypt is an Arab state located in both Africa and (partially) Asia. Egyptian business is typically conducted through the cultural lens of both European and Arab states. Large power distance and uncertainty avoidance scores underscore the importance of the Muslim faith in Egypt (Butler, 2008). Its people expect the government to rule with an iron fist. Hosni Mubarak, who became president of Egypt in 1981 upon Anwar Sadat’s assassination, was re-elected to his fifth term in 2005, but it was only the first time there was more than one candidate on the presidential ballot (British Broadcasting Corporation, 2005). Some call Egypt a democracy. Others call it a dictatorship. Islamist groups have plotted to overthrow Mubarak, who has survived at least six assassination attempts (British Broadcasting Corporation, 2008) and his government “has not hesitated to use torture and executions to crush” them (Boston Globe, 2004). Meanwhile, compared to the United States, which scores 91 as a strong individualist state, Egypt scores 38, which is higher than all of the other African countries except Libya (38) and South Africa (65) (Table 5). Egypt’s score on individualism also is higher than most African,

Asian and Latin American states. Egypt and Libya both score second highest among African nations on masculinity, behind South Africa, which is the “most European country” in Africa.

Table 5

How African Countries Score on Hofstede’s Indices

Africa

East	PDI	IDV	MAS	UAI	LTO
Ethiopia	64	27	41	52	--
Kenya	64	27	41	52	--
Zambia	77	20	46	54	--
Tanzania	64	27	41	52	25
West	PDI	IDV	MAS	UAI	LTO
Ghana 77	20	46	54	--	
Nigeria77	20	46	54	--	
S. Leone	77	20	46	54	--
Southern Africa					
	PDI	IDV	MAS	UAI	LTO
S. Africa	49	65	63	49	--
Arab states in Africa					
	PDI	IDV	MAS	UAI	LTO
Egypt	80	38	52	68	--
Libya	80	38	52	68	--

PDI: Power Distance Index. IDV: Individualism vs. Collectivism.
 MAS: Masculinity vs. Femininity. UAI: Uncertainty Avoidance.
 LTO: Long-term Orientation

Source: Clearly Cultural.com

East Africa — In looking at East Africa, Hofstede studied Ethiopia, Kenya, Tanzania, and Zambia. Collectively, these countries score (on average) 64 on power distance, 52 on uncertainty avoidance, 41 on masculinity and 27 on individualism (ITIM International, 2008). While it seems wrong that Hofstede would combine four nations and make generalizations about them as a group, he argues that their previous colonial masters perpetrated a fraud by dividing up national borders in Africa according to “white man’s logic” rather than according to cultural similarities and differences (even nuances of differences) (ITIM International and Hofstede and Hofstede, 2005, 18).

West Africa — In looking at West Africa, Hofstede studied Ghana, Nigeria and Sierra Leone. Collectively, these countries score (on average) 64 on power distance, 52 on uncertainty avoidance, 41 on masculinity and 27 on individualism (ITIM International). As anthropologists have known for decades, religion is analogous to culture in some regions of the world. Thus Muslim African nations such as Sierra Leone and Nigeria will have more cultural similarities with Muslim Arab states than with non-Muslim African nations. These nations also are apt to have higher power distance rankings than predominantly Christian nations in Africa such as Ghana. The unnamed IBC authors urge readers to use their information about West Africa “with caution.” They say this based on the divergent religions within the West African countries grouping (ITIM International).

Asia — Asia is a vast continent, whose countries have geographic and cultural ties to Europe and Africa as well as each other. Below is cultural information about China, one of the Asian countries Hofstede studied (Table 6):

China — As a Communist country for six decades, China scores very low (20) on individualism, albeit not as low as non-Communist Taiwan (17), Pakistan (14) or Indonesia (14).

Collectivism is a hallmark of Communist countries such as China, which emphasize group work and group think over that of individualism. Nevertheless, China scores lower on PDI than the Asian average (24), as Asia includes two democracies (Turkey and India). As with other Asian countries, China scores high on long-term orientation (118). People and organizations in China privilege long-term goals over immediate gratification (the latter is considered a positive trait by many in the West). “This Dimension indicates a society’s time perspective and an attitude of persevering; that is, overcoming obstacles with time, if not with will and strength” (ITIM International, 2008). Another facet of collectivism/communism is loyalty.

Table 6
How Asian Countries Score on Hofstede’s Indices.

Country	PDI	IDV	MAS	UAI	LTO
Malaysia	104	26	50	36	--
Philippines	94	32	64	44	19
China	80	20	66	40	18
Indonesia	78	14	46	48	--
India	77	48	56	40	61
Singapore	74	20	48	8	48
Hong Kong	68	25	57	29	96
Turkey	66	37	45	85	--
Thailand	64	20	34	64	56
Taiwan	58	17	45	69	87
Pakistan	55	14	50	70	--

PDI: Power Distance Index. IDV: Individualism vs. Collectivism.
MAS: Masculinity vs. Femininity. UAI: Uncertainty Avoidance.
LTO: Long-term Orientation

Source: Clearly Cultural.com

Table 7

How Latin American Countries Score on Hofstede's Indices.

Latin America

Country	PDI	IDV	MAS	UAI	LTO
Panama	95	11	44	86	--
Mexico	81	30	69	82	--
Venezuela	81	12	73	76	--
Ecuador	78	8	63	67	--
Brazil	69	38	49	76	65
Colombia	67	13	64	80	--
El Salvador	66	19	40	94	--
Peru	64	16	42	87	--
Chile	63	23	28	86	--
Uruguay	61	36	38	100	--
Chile	63	23	28	86	--
Argentina	49	46	56	86	--
Jamaica	45	39	68	13	--
Costa Rica	35	15	21	86	--

PDI: Power Distance Index. IDV: Individualism vs. Collectivism.

MAS: Masculinity vs. Femininity. UAI: Uncertainty Avoidance.

LTO: Long-term Orientation

Source: Clearly Cultural.com

Below is cultural information about Brazil, one of the Latin American countries Hofstede studied (Table 7):

Brazil — Many of the Latin American countries have similar cultural characteristics. Brazil is no exception. Among its “Hofstede index” scores, Brazil scores highest on uncertainty avoidance (76). The people of Brazil, who desire to reduce uncertainty in their lives, allow their government to adopt strict laws. Because they abhor uncertainty, change, a major incubator for uncertainty, is not welcome in Brazil. The dominance of Catholicism in Brazil creates a culture wherein people hold and share “truth,” another contributor to the high UA score. With a score of 38, Brazil scores higher than the relatively low Latin American average score on individualism (21).

Criticisms of Hofstede

Hofstede’s theory of cultural dimensions is useful for “characterizing, predicting, identifying, and interpreting” how people behave in cultures. Understanding these concepts gives researchers an opportunity to make predictions about behavior based on culture, “so the observed behaviors are not perceived as personal affronts” (McFarland, 1999). But he is not without critics. They have criticized his methodology (attitude-survey questionnaires). They have said that his sample of IBM employees is not representative of the rest of the world to which his research extrapolates. They have called his research culturally biased, because individuals from America and Europe comprised the teams conducting research in the southern hemisphere. Finally, they have stated that his research has become outdated due to globalization (ITIM International, 2008). Below is a discussion of each criticism:

Methodology — Hofstede and his team used attitude-survey questionnaires that may not have been thorough, but they were appropriate for the task of generating research on IBM employees working in 53 countries. The data would have been different if they had conducted ethnographic research. But the conclusions that would have been drawn from such a qualitative

analysis might have been the same. Hofstede conducted his quantitative research between 1967 and 1973. Thirty years later, Creswell (2003) wrote that mixed methods — a combination of qualitative and quantitative methods “has come of age” (p. 4).

Population representation — Are middle class IBM employees representative of everyone else in the world? Is the typical British IBM worker equally as different from a French IBM worker as an Englishman is from a Frenchman? Do IBM workers so immerse themselves in that corporate environment and acculturate so readily that to be an IBM employee in France is vastly different than being a Frenchman? Hofstede contends that where one works does not totally determine one’s cultural habits. After all, many habits were acquired in childhood (ITIM International, 2008x).

Cultural bias — How can a team of Europeans conduct valid and reliable research about the culture of people from the southern hemisphere? Might ethnocentrism creep into the thoughts — and later, writings — of Hofstede’s research team? Regarding intercultural communication, Hofstede stated: “[T]he quality of development of cooperation depends on the effectiveness of the intercultural encounter ... foreign experts are only effective to the extent that they can transfer their know-how in the local context” (Hofstede in Mitry and Bradley, 1999). Thus, should foreign researchers (such as himself) be themselves while working in low-income countries? Or should they consciously “transfer their know-how in the local context” (Hofstede, 1991, in Mitry and Bradley, 1999)? Or should they develop a research style that is culturally sensitive but not pandering?

Outdated research — Globalism has caused “interdependence” (Graham, 1994) and “international cooperation” (van Heerden, 2006). But has it made Hofstede’s research seem

antiquated or obsolete? Academic research does not exist in a vacuum. Properly designed and executed, it builds on previous research and sets the stage for future research.

...

Colors

Below is a cultural color wheel, which shows how colors are interpreted differently by different cultures (Bear, 2008):

Red

China — Good luck, celebration, summoning

Cherokees — Success, triumph

India — Purity

South Africa — Color of mourning

Russia — Bolsheviks and Communism

Eastern — Worn by brides

Western — Excitement, danger, love, passion, stop, Christmas (with green)

Orange

Ireland — Religious (Protestants)

Western — Halloween (with black), creativity, autumn

Yellow

China — Nourishing

Egypt — Color of mourning

Japan — Courage

India — Merchants

Western — Hope, hazards, coward

Green

China — Green hats indicate a man's wife is cheating on him, exorcism

India — Islam

Ireland — Symbol of the entire country

Western — Spring, new birth, go, Saint Patrick's Day, Christmas (with red)

Blue

Cherokees — Defeat, trouble

Iran — Color of heaven and spirituality

Western — Depression, sadness, conservative, corporate, "something blue" bridal tradition

Purple

Thailand — Color of mourning (widows)

Western — Royalty

White

Japan — White carnation symbolizes death

Eastern — Funerals

Western — Brides, angels, good guys, hospitals, doctors, peace (white dove)

Black

China — Color for young boys

Western — Funerals, death, Halloween (with orange), bad guys, rebellion

Cross Cultural User Interface Design

The Internet and its World Wide Web are both a global library and a global marketplace. Just as the Web site Amazon.com should be designed to appeal to consumers in many cultures, a Web site devoted to malaria in Africa should be usable by health workers in each target country. Otherwise it risks “loosing (sic) and alienating audiences and customers based on cultural preferences” (Jagne et al., 2004). One of the key elements to making a site usable across cultures is to ensure that its graphical user interface (GUI) is simultaneously appropriate for each target country. This is true for all Internet platforms, from desktop computers and laptops to personal digital assistants and Smartphones. But how does one determine which platform to use?

There is a classic marketing question: Does the market demand the technology or does the technology find a market? One assumes that either case can be true, because situations vary. Marketing, of course, relies heavily on market research. There is no cultural pattern that everyone in a society can fit into. People of similar ages, races, genders, ethnic backgrounds and sexual orientations can still have many cultural differences. However, given a proper amount of “statistical regularity,” one can “identify trends and tendencies” (Marcus and Gould, 2000). Often a technology becomes popular in one culture long before it sells well in another. Smartphones, cellular telephones with Internet access, were said to be popular in Europe as early as 2003, but the same enthusiasm did not exist in the United States. Hardy (2003) cites a Jupiter Research study showing that American cellular telephone purchasers were more concerned with the phone’s size and voice functions (and cost) than advanced features such as cameras, games and personal information management (PIM) applications. A culture that privileges small cell phones would not easily adopt the bulkier Smartphones. During the first few years of the 2000s, their additional features were seen as unnecessary.

A company hoping to create graphical interfaces for Smartphones at that time would have been wise to focus on the needs and concerns — the attitudes and knowledge — of European rather than American users. Similarly, developers of a Web site liked off Essential Health and devoted to malaria would be wise to develop an interface that attracts and holds onto the attention of health workers in the developer’s target country. But that is not always the case. Web developers for organizations and corporations often concentrate more on art, branding and home page turf wars (“Put my image map above yours!”) at the expense of concern for the culture of the target audience (Sheridan, 2001). Sheridan recounts a situation in which the Japanese version of a “major Silicon Valley” company’s Web site was redesigned. The work was done, but Japanese company officials never reviewed the site before it was published live on the Web. Unfortunately, “a prominent design element was considered culturally offensive to the Japanese target audience,” Sheridan wrote. Over the next two days, the company received numerous English and Japanese e-mails regarding the flaw in the design. Fortunately, only “minimal damage was done to the company’s image” before the offensive content was removed (Sheridan, 2001). The lesson learned in this example is that time should be spent studying the culture of the target country. Sheridan calls culture “quantitatively intangible,” which perhaps is another way of saying that cultural research is primarily qualitative.

To assure that these Essential Health Links Web sites maintain high quality and serve their purposes, organizations adhere to graphical design standards written by experts. Organizations on both ends of the academic spectrum are concerned about standards, from the World Wide Web Consortium (2008) to elementary schools, such as the Franklin Lakes public school system in New Jersey (2008), where officials formed a Web site committee after determining that standards are needed for their Web presence. The same is true for developers

independently designing sites for people in other cultures. Two designers — one in Boston and the other in Paris — could work off the same set of guidelines when building a Web site designed to be accessed by people in Ghana. But how are standards to be agreed upon for the Web, especially when it is such a fluid, dynamic tool? A top-down approach in which the standards are dictated by the source to the target would probably fail. Another approach is to promote best practices that appeal to the largest number of users. This lowest-common denominator approach would require studying the culture of the target country and the citizens' Web surfing habits. Sheridan offers a number of recommendations for anyone considering cross-cultural Web design: Learn about the company for whom the site is being built. Learn about the culture of the target audience. Translate the content into the native language(s) of the target audience. Have employees of the overseas firm for whom the site is being built test a beta version of the site. Conduct focus group research that includes residents of the target country. And finally: hire a cross-cultural consultant or a global-design consultant (Sheridan, 2001).

When technology is inadequate, and replacing it is very expensive, user-interface designers, whose work is typically at the back end of a project, face built-in barriers to success. But designers can play a key role if, rather than build sites that load successfully in source countries, they successfully adapt their designs to the technological environment of target countries. For the aforementioned Ugandan PDA project, PDAs were a successful solution. According to the International Development Research Centre, health workers who collect information in the field adopted the PDAs. IDRC says the Uganda Health Information Network wants its project to be a role model for others who are collecting health care data in Africa. "It is also likely to have impacts beyond health care — network-connected PDAs have dramatic

potential for improving data collection across a wide variety of research initiatives in Africa” (International Development Research Centre, 2008).

One guiding principle of the digital research cycle is that between two fields of study lies a third field which is a combination of the first two. This third field includes facets of the others, and allows for a narrower, more succinct type of research to occur. When one is studying intercultural communication and human-computer interaction, he should look for a field that includes facets of each. One field that incorporates human-computer interaction and intercultural communication, which looks at both technology and target countries, at computers and communication, is cross-cultural user-interface design, which is perhaps the most important area of study on the digital research cycle for this research involving the Essential Health Links Web site.

One could simply define cross-cultural user-interface design as multidisciplinary field that sits at the nexus of human-computer interaction and intercultural communication. Marcus encourages developers who cross cultures to borrow ideas from Hofstede, who conceived the five dimensions of culture — explained above — to compensate for “cultural biases” which may creep into “traditional industry usability precepts” (Marcus in Smith and Salvendy, 2001a). Marcus took 10 countries Hofstede graded and plotted them in a matrix based on their scores in the power distance index (on the X axis) and femininity vs. masculinity index (on the Y axis). He explained that Web sites in feminine cultures “where gender roles are blurred” might privilege sharing over “mastery.” He also writes that such a site would benefit more from being “task-oriented” with “quicker results” than being designed to encourage grand successes, as would a site designed for a country whose score is high on the masculine index.

English speakers comprise only eight percent of the people in the world. As mentioned above, Marcus cites a statistic that 75 percent of the Web users in the world were going to be non-English speaking by 2005. Some 80 percent of European Web sites provide content in languages other than English (Marcus in Smith and Salvendy). Anyone attempting to design Web sites to be viewed by people in countries other than the home country of the source will need to take cultural factors into consideration.

Syahdan (2006) calls poetry “a soft whisper against the bads mankind wishes to unregret.” Building on Hofstede’s work, Marcus says “[p]oetry and unifying values, natural images, and traditional arts” should be used in Web sites designed to appeal to female cultures because they would have an “emotional or aesthetic appeal” as opposed to the sites designed for masculine cultures, which should be “practical, [with] strictly goal-oriented organization, navigation, and use of graphics” (Marcus in Smith and Salvendy). Marcus further points out that bias does not exist solely in the United States. He cites a Web site his firm consulted on (Arabia.com) that, while it included an English translation of the Arabic text, erroneously published this translation in right-to-left reading. This is appropriate for Arabic but not, of course, for English. This poor design choice, which was probably an innocent mistake, nevertheless gives the Western user the feeling that he is less important than Arabic viewers (Marcus in Smith and Salvendy).

In the second part of Marcus’ article he references five components he says all user interfaces contain, be they Web sites or some other technological platform. They include: metaphors, mental models, navigation, interaction and appearance:

Appearance — Visual symbols designed to attract the user’s subconscious, such as colors, fonts and verbal style.

Interaction — The user’s contact with, and feedback to/from, the computer. Examples include use of drag and drop icons, keyboards, mice, microphones and screen pens.

Mental models — Content and how it is organized. Media and tool (plug-in choices).

Metaphors — Concepts such as home, pages, shopping carts, blogs, navigation and other terms that mean one thing on the Web and something else in another context.

Navigation — Movement through the organized content (Marcus in Smith and Salvendy).

Cultural differences exist from one geographic region to another. But they also exist from one generation to another in the same region. Marcus cites Clausen (2000), who writes, “classical culture in the USA no longer exists.” He makes this point to show that while we formerly applied the term culture to group scenarios such as whether the earliest dwellers hunted or gathered food. Society in that time had so few needs that culture was thought of in very narrow terms. Today, the term “culture” has been broadened to include “lifestyle choices.” Thus, Marcus says, Web developers in such cultures should consider the difference before applying “the concepts of traditional anthropology to current product design” (Marcus in Smith and Salvendy).

How might an Internet user, surfing across cultures, be confused by a Web site? Marcus and Gould (2000) start with the date given on the site, one of many ways numbers cause confusion. Many countries use the Gregorian calendar, which is based on the birth of Jesus Christ. Some national Orthodox churches still use the Julian calendar. Still others use the Persian

Calendar, a National Calendar of India, a Hebrew calendar or an Islamic calendar (Calendar Converter, 2008). Then there is money, which changes hands worldwide as American, Australian, Canadian, Hong Kong, New Zealand or Singapore dollars, Brazilian real, Czech coruna, British pounds, Danish krone, Euros, Hungarian forint, Japanese yen, Mexican pesos, Norwegian kroners, South African rands, Swedish krona, Swiss francs and UK pounds sterling, among other currencies (CNNMoney, 2008). Another way numbers cause confusion as they cross cultures is the various systems of measurement, including the metric system (aka System International) and the Imperial and USA systems (Marcus and Gould, 2000).

As mentioned above, another consideration is color. Those that are common in the West (red, white, blue and gold, for example) are different from those that are common in Buddhist cultures (saffron yellow) or Islamic countries (green). Might it be an affront to an America-hating, Arab country to build a Web site for its people to access that has red, white and blue backgrounds and text (Marcus and Gould)? Colors have a strong — subconscious and conscious — emotional effect on people, one reason why most American political signs are red, white and blue and why the Web site for the Coalition Provisional Authority in Iraq, a group of Americans that occupied and ruled the country after the Iraq War, was accented in green. But the authors ask an important question: How might these cultural differences be understood without falling into the trap of stereotyping other cultures?” (Marcus and Gould)?

Recognizing and eliminating stereotypes is an important part of cross-cultural training. Recognizing there is some truth to clichés, Web developers must strike a balance between well-researched sites that do not offend because they are accurate and sites that omit accurate information that may offend. Examples include intercultural sites that are political in nature. The United Nations, the World Health Organization, the United States Agency for International

Development and the American Red Cross are just a few examples of agencies whose sites have the potential to provide accurate information that offends the people about whom and for whom the information is written. They must balance the need to provide accurate information with the need to be culturally sensitive.

Cultural Differences in Design

People in different cultures, who are attempting to accomplish the same tasks, may organize their work differently. Thus the order in which Web pages are listed may be different from one culture to another. This is particularly true for personal digital assistants. Content on PDAs is designed so that it may be viewed in a hurry (Marcus and Gould). GUIs are the focal point of project team members from varying departments during a site design. Web design teams can include high- and low-level programmers, system administrators, graphic artists and content specialists, among others, as well as marketing specialists. Add a cross-cultural dimension to the project and the team may now have consultants from the target country. While only a few individuals are involved in the actual coding of the site, each has an idea of how the GUI should look, and work. “As they carry out all of these tasks, however, they would do well to consider their own cultural orientation and to understand the preferred structures and processes of other cultures” (Marcus and Gould).

Marcus and Gould borrow Hofstede’s dimensions of culture model and use it to analyze Web sites designed for universities in two countries that have widely varying power distance scores. One is the Universiti Utara Malaysia (uum.edu.my). Malaysia is a low-income country with the highest PD index rating (104) in Hofstede’s research. Conversely, the Netherlands has a PD index rating of 38. For the Netherlands, Marcus and Gould look at a site built for the Ichthus

Hogeschool (www.ichthus-rdam.nl/) and the Technische Universiteit Eindhoven (tue.nl). They note that while the Malaysian site gives prominence to school leaders and important buildings, the Dutch site is dominated by images of students (Marcus and Gould).

Marcus and Gould mention ways certain facets of Web design may be impacted by the individualism vs. collectivism question, another of Hofstede's culture dimensions: Designs in individualist countries will emphasize individual achievements over group achievements. Developers of health care sites in collectivist cultures will likely emphasize ways the entire community — not just individuals — benefits from disease prevention. Sites built for some countries will emphasize “[i]mages of success,” materialism and consumerism over “achievement of social-political agendas” The latter sites are likely to be built in collectivist countries (Marcus and Gould).

Textual style, an important part of the digital research cycle, also plays a role. Whereas content might be persuasive, controversial, even “argumentative” on sites designed by or for individualist countries, and make extreme claims, content would likely be subdued on sites designed for collectivist cultures. Controversy would not be allowed. Content generated in individualist cultures, Marcus and Gould write, also likely would privilege youth over experience, action over wisdom. Meanwhile, collectivist cultures are more likely to privilege groups and products more prominently than individuals in their content. According to Marcus and Gould, individualist cultures focus on truth while collectivist cultures focus on relationships. When deciding what content to include on a Web site designed for two cultures, often designers are handed two versions of the truth about a subject matter. Which is the real truth? Individualists focus on change while collectivists focus on “tradition and history.” Marcus and Gould also write of a “willingness to provide personal information” in individualist cultures

versus collectivists cultures, where people are loathe to release data that distinguishes individuals from the groups to which they belong (Marcus and Gould).

Another example cited by Marcus and Gould is a comparison of Web sites built for national parks in countries with high and low individualism/collectivism scores, respectively. He chose the Glacier Bay National Park Web site (nps.gov/glba, Alaska, USA, IC index rating 91) and the National Parks of Costa Rica (tourismcostarica.com, Costa Rica, IC index rating 15). What are the differences? The American site tells users how to get to the park and what to do when they get there. Conversely, the Costa Rican site de-emphasizes the tourist, and helping him formulate his itinerary. Instead it focuses on “nature and uses a slogan to emphasize a national agenda.” Marcus and Gold also note that the Costa Rican site’s What’s Cool page is inappropriate. A page where one might normally find an exciting park amenity — or even a new Web site feature — contains “a massive political announcement that the Costa Rican government has signed an international agreement against the exploitation of children and adolescents. While the topic is important, it certainly is posted in the wrong place (Marcus and Gould).

Another area that Hofstede studied and Marcus and Gould followed is masculinity vs. femininity, focusing on gender roles, not physical characteristics. Web sites show biases toward male or female gender roles by providing unsolicited information that privileges one gender role or the other. He compares two Excite.com search engines from two countries with greatly varying index ratings on masculinity. The women’s Excite site for Japan (masculinity index rating of 95) and that of Sweden (rating=5) differ in that the Japanese site provides unsolicited content “toward a specific gender” while the Swedish site does not distinguish between genders in its content. Marcus and Gould also cite a site in the United States (Chickclick.com,

masculinity index rating = 52). This site, he says, focuses on the role women play in society but “leaves out later stages in a woman’s life” (Marcus and Gould).

Uncertainty avoidance (UA) is the fourth factor about which Hofstede researched and Marcus and Gould extrapolate to Web design. Different cultures have varying responses to uncertainty. Marcus and Gould cite Hofstede’s finding that businesses in high UA cultures are more formal, they prefer long-term commitments rather than short-term relationships; they focus on “tactical operations rather than strategy” (Marcus and Gould). Conversely, countries with low UA indexes are less formal. They are more concerned with long-range goals than short-range goals, as Marcus and Gould explain:

These cultures tend to be less expressive and less openly anxious; people behave quietly without showing aggression or strong emotions. ... People seem easy-going, even relaxed. Teachers may not know all the answers (or there may be more than one correct answer), run more open-ended classes, and are expected to speak in plain language. In these cultures, what is different may be viewed as simply curious, or perhaps ridiculous (Marcus and Gould, 2000).

All of this information is relevant to commercial Web design and useful for developers building Web sites in low and high UA countries. Exactly how it is relevant depends on the subject matter, textual style and technology used, and the audience. Marcus and Gould explain Web design techniques helpful in low- and high-UA countries, respectively. Web sites built for cultures with high UA index scores would emphasize simple designs. Language would be clear and brief, and word choice would be limited. In cases where people were to take action, the sites might try “to reveal or forecast the results or implications” prior to the act. Users would find that

the sites have simple navigation schemes that reduce errors. Visual cues such as color, fonts, sounds and icons would be redundant, to promote familiarity. Conversely, Web sites built for cultures with low UA index scores would be more abstract, more complex. They would encourage random surfing on the site. Links would open new windows that take the user on non-linear paths. Icons and colors would vary, so as to maximize information while minimizing familiarity (Marcus and Gould).

To illustrate the differences, Marcus and Gould cite Web sites designed for airlines based in two cultures, one high UA and one low UA. Based in Belgium, the high UA (94) carrier, Sabena Airlines, has a Web site, (sabena.com), which “shows a home page with very simple, clear imagery and limited choices” (Marcus and Gould). Based in England, the lower UA (35) carrier, British Airways, has a Web site, (britishairways.com), which “shows much more complexity of content and choices with popup windows, multiple types of interface controls, and ‘hidden’ content that must be displayed by scrolling” (Marcus and Gould).

Hofstede added the fifth “dimension” to his research in the 1980s, after becoming inspired by Bond. The new dimension was long-term orientation vs. short-term orientation. LTO countries in the East such as China privilege virtuous behavior over the “search for truth,” which is practiced by Western countries, such as the United States. Marcus and Gould adapted Hofstede’s findings to Web design and concluded that Web sites designed for LTO countries would contain “content focused on practice and practical value” (Marcus and Gould). They also would use relationships between two entities to disseminate information and gain credibility. A third design attribute of Web sites designed for LTO countries, as seen by Marcus and Gould, may be an anathema to health care: “patience in achieving results and goals.”

After using Hofstede's formulation to compare the Web sites, Marcus and Gould list several questions: If interactivity is offered by the developer, how "formal" or rewarding" should it be to the user? What motivations do "different groups" of users have? He lists money, fame, honor and achievement. All can be promised to people who surf on a Web site (Marcus and Gould). Marcus and Gould wonder if there is a limit to the amount of conflict people will accept. Would an argumentative textual style work well online? They further ask if "sincerity, harmony, or honesty [should] be used to make appeals" and about how to balance personal opinion and group opinion. Would the medical professional — based in a low-income country, using a health care Web site designed for people like herself — tolerate ambiguity? Should the site use guilt to discourage bad health practices? Marcus and Gould also ask, "What role should community values play in individualist and collectivist cultures?" This is an excellent question to ask about Web sites designed for low-income countries (Marcus and Gould).

Other questions to ask when building such Web sites: In individualist cultures, does distance learning add a dimension to education that traditional classroom learning cannot? Marcus and Gould presumably ask this question because distance learning is a solitary activity. Also: In what manner should online teachers present their material? Should they have a top-down "guru" approach or a friendly one? Should separate educational sites be designed for men and women in some cultures? They would have the same goal but present content differently. After the technological hurdles have been crossed, some developers will be faced with the question of whether personal "Webcams" are appropriate, particularly in collectivist cultures. What about advertising? It is prevalent on many sites? Would it be particularly noticeable on health sites that are designed by corporations such as drug companies? Marcus and Gould ask how much "hyperbole could be tolerated" on such sites in collectivist cultures "focused on

modesty.” Finally, would there be a conflict between the Western, source-country Web developer’s focus on truth and the Asian, target-country, health worker’s focus on “practice and virtue?” (Marcus and Gould).

Marcus concludes with a common-sense declaration about CCUID: If user-interface design does successfully merge with cross-cultural theory as a discipline, then new tools and new practices are necessary. He’s referring primarily to the development of multiple Web sites with the same content and message — but different designs — and suggests that templates or specific versioning tools could be utilized. “As the Web continues to develop globally, answering these questions, and exploring, then exploiting, these dimensions of culture will become a necessity and not an option for successful theory and practice” (Marcus, Crosscurrents, 2000).

Global Web Design

During downturns in the economy, governments seek diverse business sectors and these businesses seek to attract diverse customer bases. Their goal is to provide products and services they can export, not relying on domestic customers during a soft local economy. One of the keys to successful exporting is a cross-cultural Web site that attracts business. When BMW was looking for UI expertise in “driver-centered design” in planning the interfaces of its future vehicles, it hired Marcus’ firm, Aaron Marcus and Associates (amanda.com). The company also counts among its clients prominent European Internet service provider Tiscali (they worked on a Web gateway), the South Korean electronics giant Samsung (they worked on a next generation Smartphone called a mobile information device or Mob-i) and the J. Paul Getty Trust, an international cultural and philanthropic organization (they worked on a Web site). Many other firms have designed interfaces for cross-cultural organizations. A short list includes

SmartWebby, Veremos Global and Yahoo! Based in Chennai, India, SmartWebby (smartwebby.com) has clients in Denmark, Greece, Singapore, the United Kingdom, the United States and United Kingdom — among other countries — for which it has built more than 200 Web sites (SmartWebby, 2008). Based in Tokyo, Veremos Global's (veremosglobal.com) clients include: "Japanese corporations with multi-lingual requirements, High Street Stores [United Kingdom] looking to sell online using e-commerce, foreign companies looking to expand into the Japanese-speaking market and landlords/real estate agencies who need to gain more exposure for their properties" (Veremos Global, 2008). Yahoo! was a groundbreaking company that offered one of the first search engines/online directories. It was one of the first corporations to conduct business on the Internet, and claims to be "the world's largest global online network of integrated services" (Yahoo!-cross-cultural, n.d.).

UI Garden

As the 21st century progresses, the relationship between the West and China will gain importance. China could either become a strategic ally or a distrusted enemy of nations such as the United States and Great Britain. Those who condemn the Communist country for its undemocratic policies must balance that with westerners' fervor to trade with China. Web developers who reside in each of these groups — support China, condemn China and keep a balanced approach — all would benefit from building Web sites to be consumed by the Chinese people. Though their government limits their access to the Internet, there will be many opportunities for Chinese people — in the right place and at the right time — to access information on the Web. Western Web developers can provide these sites — with quality content and accurate cultural cues — that "stick" in the hearts and minds of the Chinese.

The Web site uiGarden plays a unique role in this effort. Researchers who use Chinese and English in their work come to this bilingual online magazine to publish their thoughts about interface design, and to share ideas. The goal of uiGarden is to facilitate information exchange and communication between the Chinese and western user-experience design communities. The developers of uiGarden say the site “will also act as a window on the user-interface design industry in the Far East, helping to give [Western developers] insights into this increasingly important market” (UI Garden, 2008). UiGarden could be a model for similar sites promoting other cross-cultural Web design exchanges. In one case study published on the ui Garden site, the Web sites of three Chinese banks were analyzed. The sites were shown to have design concerns that spanned the spectrum of the digital research cycle:

Technology/Audience — Advertisements flashed, text scrolled and graphics moved too much for comfort.

Technology — Because of the poor design users had difficulty navigating the site.

Technology — The site had interactivity, which the researchers found to be a “negative user” experience.

Audience/Subject matter— Bank branch home pages were not designed similarly.

Subject matter — A site did not possess information that would help customers start businesses. In one case, a site did offer a forum where customers (audience) could go to receive online customer support (audience) (uiGarden-Banks, 2008).

The authors of the study made six recommendations to the banks. They recommended the reduction of “flashing and moving” icons on the sites. They recommended that the developers enhance the sites’ “search and navigation” features. They suggested improving interactive features on the sites. They suggested that the banks establish Web site guidelines. They

recommended that more business banking content be added to the site. Finally, they suggested standardizing branch operations on the sites (uiGarden-Banks).

Successful Design

Even though technology makes it easier for users in target countries all over the world to adopt the cultural idiosyncrasies of Web developers from Western source countries, Jagne, Guven Smith, Duncker and Curzon (2004) say cultural differences should be considered. “[N]ot all people who use the Internet are ‘bi’ or ‘multi’cultural,” they write in a document which also includes a strategy for CCUID. Advances in technology have created a “global online marketplace” for which more than 60 percent of American companies “are not prepared” (Sun in Jagne et al.). But they would be better prepared if they understood the target countries’ cultures (Fernandez in Jagne et al., 2004). Understanding and implementing changes in a product to match the culture into which it is diffused is a process called localization. Marcus, Armitage, Frank and Guttman (1999) write that localization “refers to the issues of specific small-scale communities, often with unified language and culture, and usually at a scale smaller than countries or significant cross-national ethnic ‘regions’ (Marcus, Armitage, Frank and Guttman, 1999). Consider that there are almost 200 languages and 150 ethnic groups in Nigeria, a West African country of 128 million people (Yahoo!, 2008). But useful localization means more than translating languages, currency and time and date formats. It also means conducting research (Jagne et al.).

The key to successful design and marketing of technical products is promoting the right metaphors for each product: The operating system is Windows. The computer is a box. The screen is a monitor (who is monitoring whom?) The handheld device is a mouse. Jagne et al.

mention research by two groups that indicated non-Western consumers reject products that are based on Western metaphors. In its place they prefer products that have been localized and adhere to their customs. Jagne et al. argue that once they understand the culture of the target audience, designers will agree that conventional theories about culture — ones like Hofstede's which were located at the business schools — may not be appropriate for use in all circumstances. It seems the key to understanding someone else's culture is to let go of your own (Jagne et al.).

Jagne et al. quote Hall (2001), who writes that portrayals of culture by researchers such as Hofstede are “descriptive and not prescriptive” (Hall in Jagne et al.), implying it would be wrong to use Hofstede's theories to predict one's attitude about a Web site. There are three categories into which the unsuccessful interfaces, experiments and theories based on “existing cultural models” fall (Jagne et al.). They are: “Theoretical studies that use existing cultural models;” “empirical studies that use existing cultural models; and “theoretical works that use existing models combined with other approaches” (Jagne et al.). Looking at each approach through the lens of Jagne et al.:

Theoretical studies that use existing cultural models — They question the validity of guidelines for cross-cultural Web design espoused by Sheridan. They state that no usability studies were conducted to show that Hofstede's theory works in the Web design field. They also point out that two people from the same country “do not necessarily fit” into the groupings created by Hofstede. Finally, the authors decry the fact that culture is the only factor that Sheridan considers (Jagne et al.).

Empirical studies that use existing cultural models — Jagne et al. cite a study that compares Chinese and British consumers on their satisfaction with and preference for financially oriented Web sites. The authors state that while Smith et al. (2001) use the terms ‘perception’ and ‘preference’ they “do not say if they are equating satisfaction to perception.” Moreover, they did not study the usability of the various sites. They also provided detailed information about their sample of Chinese students but no information about those who are British.

In another study that spins off Hofstede’s research, Simon (XXXX) looked at how business school students from Asia, Europe, North America and South/Latin America perceived certain Web sites would succeed in their home country. The main question was whether they should be localized. Simon found that the tailoring of sites was justified because there were enough differences between the students from the different countries and cultures — as well as enough differences in gender-based perceptions. Simon’s sample was corrupted by the fact that the subjects of the study were living at the time in the United States, not their native countries, about which they were drawing conclusions. Simon acknowledges limitations with Hofstede’s model. Jagne et al. expound on that thesis, citing Bourges-Waldegg and Scrivener (1998) (it is too stereotypical) and Nocera and Hall (2003) (it is too rigid). Bourges-Waldegg and Scrivener decry localization because they feel the methods of the time are “inadequate,” “insensitive” and capable of reinforcing negative stereotypes. Among these are the alleged affection of the Japanese for the color white and the notion that Germans lack humor.

Nocera and Hall say Hofstede supplies a fast way to generate cross-cultural Web design solutions. In addition to calling his research rigid (above), which may be the result of its quantitative nature — How can a numerical grade be assigned to what is essentially qualitative research? — Nocera and Hall decry Nielson’s use of the term “usability engineering,” which

“considers computers and humans as equally abstract information processing entities” (Jagne et al., 2004).

Theoretical works that use existing models combined with other approaches — Zahedi et al. in Jagne et al. (2004) combine Hofstede’s categories, Hall’s “structure of time” and social constructionist theory to come up with their own vision for global Web design. In the end, they conclude that successful Web sites focus on “culture and individual characteristics” (Jagne et al.). What is more important in Web design, the site’s usability or the user’s satisfaction, the latter being a term Zahedi et al. say is influenced by the perceived usefulness of a Web site? Jagne et al. say Zahedi et al. are wrong to privilege satisfaction over usability. Jagne et al. also decry the fact that Zahedi et al. draw conclusions about Web design even though — they say — “all of their propositions and examples of them concentrate on text alone” (Jagne et al.).

For some, including Sun, usability should be approached from a humanist perspective. This approach “includes context and culture and gives more leverage to users” (Jagne et al.). Sun combined the work of Zahedi et al. with that of others and generated “a tentative model for cultural usability” (Jagne et al.). At the time Jagne et al. conducted their research, no research had been done “to support Sun’s model” but they recommend it anyway.

His model combines dynamic processes and changing variables from existing cultural models. Sun uses the ecology metaphor for technology, which includes local differences, while still capturing the strong interrelationships among the social, economic and political contexts in which technology is invented and used (Jagne et al., 2004).

Jagne et al. add that Bourges-Waldegg and Scrivener share Sun's emphasis on local differences and social contexts. Sun created a "circuit of culture" that Bourges-Waldegg and Scrivener advocate because while so much research at that time focused on target cultures, "cultures are not ontologically objective and they are continuously interacting and developing" (Bourges-Waldegg and Scrivener in Jagne et al.).

In their summary, Jagne et al. recommend Nielson's notion that one route toward success is for a company or organization to have two Web sites — one global and one local. The global site would end in .com and would presumably be Western in nature. The local site would end in a country domain such as .uk (United Kingdom) or .au (Australia) and would include content that is designed to appeal to the residents of the target country, or to at least try to meet them half way. Jagne et al. contend that Web developers should "create their own" cultural models, because utilizing the cultural models of others such as Hofstede, they say, would open them, and their company up to ridicule for perpetuating stereotypes. One of the foundations of the digital research cycle, a multidisciplinary approach to Web design, is that developers should conduct research about the cultures they are designing for and draw their own conclusions.

Del Galdo and Nielson also proposed the "create your own" cultural model philosophy. Hall had a similar philosophy, one that "descriptive frameworks" such as that by Hofstede should be disposed of. Designers should become anthropologists or ethnographers and "engage with the cultures directly" (Hall in Jagne et al.). Jagne et al. also decry the interchangeable use of certain terms common to human-computer interaction practitioners, such as usability, perception, satisfaction and accessibility. Creating a "standardisation of terms," they say — citing Hall — will make developers' access to cultural usability information less expensive and less time consuming.

Jagne et al. offer a four-stage model for cross-cultural user-interface design, using a fictitious e-commerce site: Investigation, translation, implementation and evaluation.

Investigation —It is important to see a culture from the point of view of a native. To do so, one could conduct an “ethno-methodologically informed ethnographic study” (Jagne et al.). “Participant observation” is the key. Observe how natives shop and learn why they shop those particular ways. Have shoppers fill out questionnaires. Translation — Identify “social and cultural” markers that help one to “localize the interface” (Jagne et al.). This is an opportune time for one to work to ensure that the site is not culturally offensive. These would include, but are not limited to visual (images, colors), textual (words, phrases), audio, video and animated elements of a site. The authors recommend “foraging” e-commerce sites on the Web. By this they mean deconstructing the sites to create lists of their target countries, languages, images, colors, trust signs, language cues, metaphors and design layout styles. To this list one could add source countries, technology used by source, technology expected of target and textual style. A Web developer, who has expectations of becoming a cultural/usability expert about his target country, could interview established cultural/usability experts of that country. Finally, audit the sites to determine which ones “match the expectations” of the target countries. Implementation — Take the results of the investigation and use that data to create a “ ‘socio-culturally’-localisable eCommerce site” (Jagne et al.). One should be able to bring up various countries in a drop-down menu, from which the cultural attributes of the chosen country would then become available to the user. Among other attributes, some of the most important are language, time and currency. The authors then recommend that the prototype e-commerce site be published online and that usability tests be performed, using users from the target countries. Methods to be considered include usability questionnaires, “think aloud protocol” and observational studies.

The authors cite Lister in recommending using Netusability software, as it records data in audio and video formats, as well as click-through information. “This produces an in-depth examination of the user experience of the Web site and the visual data from the tests will show the differences experienced by the user (Lister, 1981, in Jagne et al.). Evaluation — Analyze the usability tests and amend the site. Consider the site a living document to be changed as new cultural information is learned. A Web site is dynamic. It is not a static object.

Sun’s Study

In the aforementioned study Sun looks at ways to achieve better Web site localization through a three-step process: He proposes that we 1) define criteria; 2) search for “efficient and effective strategies and techniques;” and 3) evaluate current practices (Sun, 2001). More specifically, Sun presents results of a pilot study that examines “cultural dimensions of website localization” regarding two American corporations. Sun interviewed target users about their experiences regarding four categories of cultural markers in the use of localized Web pages: language, visuals, colors and page layout. International users from Asia, Europe and South America participated in “comparative usability tests.” Sun cites Barber and Badre in defining cultural markers as “ ‘interface design elements and features that are prevalent, and possibly preferred, within a particular cultural group’ ” (Barber and Badre in Sun). Corporations use cultural markers to help people from other cultures feel more comfortable using their sites. Cultural markers signify cultural affiliations between the site and the user. They also promote the ease of use of the site’s main features. The categories of cultural markers included: HTML specific, icons/metaphors, colors, specific colors, grouping, flag, font, language, links, geography, regional, orientation, shapes, sound and architecture. Combining the terms culture and usability, Barber and Badre fashioned the term “culturability” (Sun).

HTML specific is a diverse category. It refers to items such as the use of lines of text, links, tables, and italics. Icons/metaphors refers to such terms and things as international, local, clocks, newspapers and books. “Colors” refers to the three primary colors, plus green, purple, pink, gold, teal, black and white, among others. “Specific colors” refers to flags, graphics, pictures, borders and backgrounds. Grouping refers to symmetrical, asymmetrical, proximity, alignment, boundary, enclosure and connection. Flags are native, foreign or multiple. Fonts are cursive, italics, bold, of different sizes and differently shaded. Links are color, embedded, standalone and internal/external. Regional refers to foliage, animals, landscape, water and desert. Shapes refers to squares, circles, triangles, rectangles, lines and arrows. Architecture refers to state buildings, houses, churches, offices and cityscapes (Sun).

As mentioned above, Sun interviewed target users about their experiences regarding four categories of cultural markers in the use of localized Web pages: language, visuals, colors and page layout. She made six primary findings: 1) “Culture is an important design element in the multilingual Web page design”; 2) “Cultural markers are noticeable in multilingual Web design”; 3) “Cultural markers can increase the usability of multilingual Web pages”; 4) “When cultural markers conflict with usability, some users prefer usability over cultural-sensitivity”; 5) “Users from different cultures prefer different modes of cultural markers” and 6) “The current use of cultural markers in multilingual websites is not very effective” (Sun).

CHAPTER TWO

Human Computer Interaction

While the top half of the digital research cycle (Figure 12) represents the texts that are “published” in the digital world, the bottom half represents the technologies that are utilized. In the study of Web sites dedicated to health care in low-income countries, the primary

technologies are personal computers and the World Wide Web. Thus the lower region of the digital research cycle is represented by user-interface theories and human-computer interaction.

Researchers in the cognitive sciences often observe people interacting with their peers or their families. It would be easy to find such research in fields such as anthropology, communication studies, linguistics, philosophy, psychology or sociology, or a combination thereof. Such multidisciplinary research has been conducted for generations and “coalesced” as cognitive science during the 1970s. The emergence of computers during the past 30 years has allowed — some would say necessitated — that the researchers in these disciplines begin to study how humans interact with machines as well. The field of human-computer interaction includes — among others — work done by researchers in these fields, plus that of software and human factors engineers and experts in ergonomics and graphic design. HCI was one of the first of many fields to be studied in a multidisciplinary fashion (Carroll, 2003, p. 3).

Before HCI evolved into a multidisciplinary approach it was initially the marriage of software and human factors engineering. In its infancy, HCI was not widely accepted by computer professionals. Software development occurred in a linear fashion, and HCI was placed at the end of the process. Thirty years later, HCI research has improved and now helps people and organizations learn how to work with computers (Carroll, 2003, p. 1). It has helped make both man and machine more productive. Initial studies showed HCI to be useful in training and supporting computer programmers in two types of design: participatory design and ethnographically driven design. With participatory design, end users become a part of the design process. Ethnographically driven design is the process by which designers study the work practices of those who use the technology, to ensure that it “supports work as it is practiced” (p. 2). While it is certain that most computer manufacturers engage in both types of design, it is not

certain whether individual Web developers do. In the present study, it would be helpful to know whether developers of Web sites linked off Essential Health involve end users in the design of these sites and whether the sites support work performed in a standard fashion (p. 2). That is an issue for future research.

Researchers hoped HCI would evolve from a cognitive science to an applied science through applying its theories and methods to software development. Specifically, they hoped cognitive-science theory principles such as perception and motor activity, problem-solving and language, communication and group behavior would be applied to the early stages of software development as well as to the development of a “domain theory” of HCL (p. 3).

Carroll calls the first decade of HCI a “golden age of science” and says much progress was made (p. 3). One example he cites is work by Card, Morgan and Newell, who developed the “Goals, Operators, Methods and Selection” (GOMS) model, which is used for studying interactions between people and their computers. Researchers use GOMS to observe users as they perform tasks that they have already “mastered” (Mackenzie in Carroll, p. 60).

The individual parts of the GOMS acronym are explained this way: Goals refer to the computer system user’s task, such as an editing text. “Operators” refers to “the actions that the software allows the user to take” such as keystrokes, mouse clicks, voice commands and eye movements to which the software responds (p. 59). Methods refers to oft-used operator sequences that become well-known and internalized by the user, such as how to cut and move text in a word processing program (p. 60). There may be several methods designed to accomplish the same goal. Selection refers to the choice the user makes: Does he use the rub out key and retype the text rather than cut and paste it (p. 60)?

HCI was an “emerging scientific discipline” in the 1980s when Newell’s address at the ACM CHI Conference established his “technical vision of a psychology of HCI” (Carroll, p. 3). This concept relies on a linear formulation. Meanwhile, Card, Moran and Newell proposed three structural variables in computer use: the task (text editing), the computer and the user (including expert users). These structural variables determine performance variables such as systems functionality, learnability, efficiency, error proneness and user satisfaction. These performance variables help to establish performance models “for predicting the performance of the human-computer system” (Clemmensen, 2003). Performance models are both formal (in a fixed situation) and informal (where change, such as improvements to the system, may occur). Performance models are one of three parts of Card, Moran and Newell’s framework. The others are 2) how the system is structured and how it performs; and 3) “design function for using the performance models in the design process. Thus the design process depends on a set of design functions that work on design sub problems and performance models to generate solutions” (Clemmensen). In other words, the whole is the sum of its parts.

Clemmensen also reflects on Booth, who reviewed the usefulness of HCI theory by suggesting that such theory should be both useful to and understandable by designers. “Booth saw the failure of HCI theories in design practice as build (sp) into Newell and Card’s cumulative approach to HCI,” Clemmensen wrote, because system designers were not trained to understand and apply HCI theory. He further argued that “ ‘much of cognitive science [which he equated to psychology] is inaccessible to the designer ... the limitations and potential uses of theories and ideas from this area are not understood’ “ (Clemmensen).

Ideas were plentiful as HCI entered the late 1980s. Carroll cites four foundation blocks: The first was differentiation, the growing amount of research involving users other than novices.

Another foundation block was the growing regularity with which social psychologists, sociologists and anthropologists embraced HCI and conducted multidisciplinary research. One example is Suchman's 1987 research involving photocopier usability. Carroll says Suchman likened human's encounters with machines to a "conversation that frequently fails" because the two parties do not understand one another (p. 4). But the important feature is not that man and computer are different, like a variation on the "men are from Mars; women are from Venus" formulation in the study of human relationships. Rather it is that they are similar. Aboulafia & Gould likened "the cognitive science model of humans as information processors with sensory inputs and motor outputs not unlike the computer" (Hasan, 1998). Carroll's third foundation block is the increasing internationalization of HCI, while the fourth is technology, specifically the important roles of personal computers and spreadsheets in the growth of HCI (p. 4). These final two foundations of HCI are important elements in the rationale for this dissertation topic — the internationalization of usability and the growing importance of computers to health care in low-income countries — and thus justify the inclusion of HCI in this particular digital research cycle.

With these foundation blocks and relying on the "concepts and methods" of cognitive science (p. 5), HCI has become an important field in science and technology. While HCI relies on cognitive science, the latter has prospered because of the former as well. During the 1990s and early 2000s, HCI found a home as a subset of computer science. It was named one of the nine core areas of the computer-science discipline by an Association for Computing Machinery task force in 1988 (p. 8). Later a joint committee consisting of ACM professionals and those from the Institute of Electrical and Electronic Engineers (IEEE) found that HCI should be included in collegiate computer science curriculum.

Sir Francis Bacon once commented that he wished scientists acted more like bees than like ants or spiders. “Data-driven ants and theory-spinning spiders, make way for those sedulous bees, busy blending fact and fancy to fashion hives both sturdy and productive” (Mascolini, 2004). Anytime a multidisciplinary field is successful, fragmentation is an inevitable, unfortunate result. The HCI field is similar. Carroll might say that he wished HCI theorists acted more like bees than ants or spiders. “There are too many theories, too many methods, too many application domains, too many systems,” he says (p. 6). Researchers in this field often find difficulty in obtaining a “breadth of working knowledge” (p. 6). Instead they seek a depth of knowledge in one or a few areas of HCI.

Theories of HCI

Carroll introduces more than two-dozen “scientific foundations” in his seminal work, *HCI Models, Theories and Frameworks*. Below is a sample.

Activity Theory — The Global Network of People Living with HIV/AIDS (gnplus.net) operates a Web site linked off Essential Health that supports this “global network for and by people with HIV/AIDS.” The goal of this organization, which is based in Amsterdam, is to “work to improve the quality of life of people living with HIV/AIDS” (Global Network of People Living with HIV/AIDS, 2008). Many medical professionals, people with AIDS and their friends and family members set a goal, to gain knowledge about living with AIDS. One activity they can perform in that regard is to look at this organization’s Web site. The outcome of that effort hopefully matches their goal of gaining knowledge, when the activity — surfing the site — is concluded. Surfing the site involves a number of actions, such as typing, scrolling and clicking. Actions are comprised of learned operations, many of which are unconsciously conducted or “automated” (Waite, 2005) by the user, such as focusing the eye on some on-screen

text, symbols or icons but not on others. Once an activity — such as clicking on links — becomes rudimentary, it becomes an action; maybe even an operation, in an effort to accomplish a larger goal. Activities, actions, goals and outcomes are the primary elements of activity theory, which was developed in Germany and the Soviet Union as an alternative to psychoanalysis and behaviorism (Waite). It was conceived to show the impact society has on a person's attitudes, behaviors and knowledge. HCI researchers use activity theory to help them understand how a community affects a computer user's goals.

An HCI researcher who utilizes activity theory to study users of this AIDS-related Web site might find out how group dynamics affected individuals' actions. The AIDS community is small, relative to the population, but in 20+ years it has succeeded in establishing rules for how it is to be dealt with by the media, including Web developers. The researcher would also learn how the users' knowledge and their use of computers changed during the surfing process. In addition to this ethnographic research, he might also conduct participatory research by recruiting a group of people unaffected by AIDS — such as Gulf War veterans, for example — to use the site to determine if it meets the needs of this relatively small group of individuals. Does the site provide the tools they need? Does it follow the rules (spoken and unspoken) set up by the AIDS patients? This theory will not help a researcher predict how the site user will interact with the site. But it will help developers, in a broader sense, by showing them what information the patients need. It may also help them differentiate between patients in target audiences and those who would not benefit from accessing the site.

Mediated by culture — Activity theory “is based on the idea that human activity is mediated by cultural signs: words and tools, which cause changes in that activity, and thus its internal mental reflection” (Vygotsky, 1978, in Hasan, 1998). This theory is significant because

use of tools distinguishes humans from animals (Hasan). There are two types of tools: physical and psychological. Physical tools are artifacts such as computers. Examples of psychological tools are language and ideas. When a user clicks a mouse, an image on a computer screen can change from a dove to a bear. When the user sees the dove disappear and the bear appear, his blood pressure could go up — or go down. Computers help humans cope in the modern world from both a physical and psychological standpoint (Hasan). But humans give feedback about the interaction. How we interact with computers is based on the physical and psychological impact the hardware, software and content have on us as we use them.

This theory postulates that “activity” results when an individual’s actions are “mediated” through tools/artifacts: touching a keyboard, scanning a monitor, clicking a mouse. Carroll’s glossary refers to activities mediated by “information artifacts” (p. 463) as an element of HCI. The theory privileges group activity over that of isolated individuals, looking at cultural considerations and “technical mediation of human activity” (p. 298). An activity is “the basic unit of analysis of all human endeavour” (Hasan) and “[m]otivated activity” is the cornerstone of the theory, which studies computers while they are in use, not when they are static, i.e. powered off. The theory allows researchers to look at HCI both through a narrow lens of single uses as well as through a broader lens that includes multiple, sequential computer activities. Further, activity theory in HCI focuses on four areas, as defined by Carroll:

“Analysis and design for a particular work practice with concern for qualifications, work environment, division of labor ...” (p. 294). Before an organization begins a new computerized project, it is important to consider matters such as the qualifications of the workers involved, their work environment and how the work will be assigned. “Analysis and design with focus on actual use and the complexity of multiuser activity. In particular, the notion of the artifact as

mediator of human activity is essential” (p. 294) — Interfaces can be changed more readily than people. The point of HCI is to match users with interfaces where they can be most productive. “Focus on the development of expertise and of use in general” (p. 294) — Suchman’s analogy of one’s interface with a computer to that of a conversation was mentioned above. Repeated successful “conversations” can result in this type of expertise. “Active user participation in design, and focus on use as part of design” (294) — Katz-Haas (1998) writes about “user-centered design” in an article for the Society for Technical Communication. He recommends 10 “guidelines” for success in this field. From among the most important guidelines are these vital questions: “What do users expect from this Web site? How do users expect this interface will work?” Finally, the tools activity theory offers are conceptual, not designed for practical application (p. 294).

As mentioned earlier, activity theory is not predictive. To use a sports analogy, activity theory will not tell the score before the game is played. But it will give one with a solid game plan. Developers and researchers can devise a game plan by answering a series of questions like the ones Waite answered when he looked at the development of a mobile computing tool that people with low vision use in a museum setting. Below, Waite’s questions are reprinted, followed by answers written as though the questions were asked about the Global Network of People Living with HIV/AIDS. (While some of the information is redundant, it is nevertheless included to show the breadth of the questions.)

Q: First of all what is the activity we are trying to support?

The activity is learning about living with AIDS.

Q: Who are the individuals we are designing the tool for?

The individuals are AIDS patients, their families and friends, and health care professionals.

Q: What tools will they need?

The tools needed are an Internet-ready computer, Internet access and knowledge of how to navigate the World Wide Web.

Q: What are the objects that they are working on?

They all share the following objects: Use of a computer to surf the World Wide Web; a lack of knowledge about certain aspects of AIDS; a desire to learn quickly. Even health workers — to a degree — have a lack of knowledge.

Q: What is the transformational outcome they are working toward?

The transformational outcome is learning to cope with AIDS.

Q: Who is the community?

The community is the growing group of people with AIDS, their friends and family members, and health care professionals. The community also includes people who do not treat AIDS patients kindly.

Q: What are some typical rules regarding AIDS?

For patients: “AIDS is about my health. I want to live a normal life. I want to maintain my lifestyle. Others should not discriminate against me.”

For friends and family members: “I love the AIDS patient. I must be supportive.”

For health care professionals: “AIDS is the plague of my era. I want to help my patients.”

Other questions (Waite):

What are the motives for this activity?

What are some of the contradictions inherent in this activity?

What are some of the actions the device could support?

What are some of the goals that AIDS patients and the others have?

What are some of the conditions that the Web user may encounter?

What are some of the operations that the Web user may need to perform?

What activity level support is the Web site going to provide?

What action level support is the Web site going to provide?

What operation level support is the Web site going to provide?

What are the contradictions that may create barriers for implementing this solution?

Adaptationist approaches — This concept grew as a response to a number of researchers who merely taxonomized “observed behavior in an atheoretical manner” (Pirolli, 164, in Carroll). According to Carroll, the aforementioned GOMS model and the Model Human Processor (MHP) fall into a category of models where complex human behavior was believed to be “mechanistic” or “ad hoc” (having sole purpose). MHP likens the mind to a personal computer. GOMS is software that runs on MHP. Researchers realized that mechanistic or ad-hoc models could not explain truly human behavior. For example, a user can navigate around a software program if she understands why it exists, even if she does not know how it works (p. 163-164). Better — not more — information is needed, to understand behavior. Pirolli used two other apt examples: A limb is a lever but a theory of levers cannot answer all that could be known about animal limbs; and a mind processes information but a theory of information processing cannot begin to explain the mind (p. 163).

Cognitive dimensions framework — Much is written about the needs of computer users, but what of the designers and their needs. Designers are given the results of user-centered design research. They study the theories summarized herein. Blackwell and Green write that designers “must be able (and willing) to interpret and apply theoretical results” (p. 103). An alternative approach to providing theory is to provide checklists, or a series of them, to designers.

Checklists, often highly-structured, are typically provided in software textbooks. But not everyone believes they are useful, especially for complicated designs. Examples include visual-programming languages, central-heating controls and “the ubiquitous computing platforms of the future” beyond Microsoft Windows, foreshadowing a complicated design process even as the user’s experience (hopefully) becomes even simpler than Windows (p. 104). Finally, Blackwell and Green (2003) call user-interface design “currently far more of a craft than an engineering discipline” because it is a multidisciplinary approach, incorporating “affect, fashion and social acceptance” (p. 104). The authors mention research comparing knitting and helicopter design (Eckert and Stacy, 2000, in Blackwell and Green in Carroll). They found that designers in this research create their own language during the collaborative design process. Blackwell and Green write that they hope to do the same for user-interface designers (p. 104).

Complexity theory — The most important question that developers of Web sites devoted to health care in low-income countries can ask themselves is whether the site, for whatever reason, is too difficult to use. The content, cultural and usability (HCI) aspects of the digital research cycle help developers answer these questions: Is the content accurate? Is it culturally appropriate? Is the technology usable? Complexity theory asks the latter question as well. Of what value would a Web site be to a health worker in Africa if the site were not designed in a manner compatible with the user’s hardware, software and Internet connection? It would not be useful.

Design rationale — Everything that has ever been made was initially designed (and perhaps, later, modified) on the basis of an idea. Developers and inventors arrive at their concepts through varying combinations of research and instinct. Some ideas are the property of individuals while others are group efforts. Some ideas are more “original” than others (No idea is

entirely original.). Some are formulated on the back of a napkin while others include enough documentation to fill a DVD. However they are conceived, the product is the result of a design rationale, the developer's reason(s) for the decisions (s)he made. During the 1980s, when personal computing was in its infancy, the industry needed theories that dealt with new users, who were tasked to learn programs, solve problems and — inevitably — fix programming errors. However the best theory in the field at that time was not useful in that realm. Rather, it related to “isolated users working without errors on routine tasks” (Carroll and Rosson, p. 432, in Carroll). Thus theory could not help solve many of the emerging problems related to HCI that were emerging in the workplace. Some people still hold low regard for theory in this field, preferring the more tangible approach of duplicating successful outcomes experienced by themselves and others. Late in the decade there was a debate as to whether theory benefits science and technology or science and technology benefit theory (p. 432). Carroll looks at theories supporting design rationale and discusses four ways it supports the development of theories in human-computer interaction. They are action science, ecological science and synthetic science.

Action science — This comes from the notion that a scientist can invent something (descriptive science) and then use it (applied science), rather than hand it off to others who would use it. Action science merges the research lab and the emergency room. It is more efficient because less information is lost if there is no knowledge transfer. The most importance concept is conceiving ways to foment change. Thus one must play a role in the application of the research. The process of creating and assessing, creating and assessing (repeat), is paramount. Action science also adds a social role to research and application because it includes “all stakeholders in the research” (p. 442). In HCI, developers and end users are considered the stakeholders in a project. Action science includes end users and developers in the research phase

as well.

Ecological science — Three levels of ecological science exist within HCI: taxonomic science, design science and evolutionary science. In biology, Linnaeus “put order into the profusion of plants and animals” by developing a binomial nomenclature (Headrick, 2000, p. 23). Similarly, the design rationale process leads to formation and application of a “taxonomic science of HCI” (Carroll, p. 441). Documenting discoveries helps present and future researchers ensure that successes — but not mistakes — are repeated. In Carroll’s words, we should “describe design rationales to taxonomize features, consequences and tradeoffs” (p. 441).

Design science — This concept involves the notion that one can take a specific design, such as a digitized MOO town map, and generalize its description with other things. Carroll says such a map could be generalized to “a containment model of space” or Web sites. In Carroll’s words, we must “generalize design rationales into explanations of human behavior and experience (p. 441).

Evolutionary science — No artifact was ever designed in a vacuum. Everything that has ever been made was the result of the impact that culture and events had on the developer(s). They hope to produce tools that people will use to successfully complete tasks. Often a new tool is introduced into an environment which makes the task easier to accomplish, or even unnecessary. Sometimes introduction of new tools makes peripheral tasks more difficult to accomplish. Carroll calls this sequence the “task-artifact cycle.” In his words, we must “project, understand and manage the trajectories of change in the task-artifact cycle. (p. 441).

Synthetic science — One of the primary goals of HCI is to increase the ease with which one uses a computer. Through proper motivation, training and repetition, users master tasks both

small and large, from simple keyboard strokes to complex programming. Occasionally, however, mastering a skill has a negative effect on the user. This occurs when the user begins to see the task as so simple that his or her role in the project — and organization — is diminished. Perceived lack of job security may result (Carroll and Rosson, p. 443-444 in Carroll). Contrasting it with the common understanding of “science” (from anatomy to zoology), Greenberg and Thimbleby (1992) see HCI as a synthetic science, one in which rather than trying to “understand the real world,” researchers are trying to build a world that can be understood by users.

Guiard’s Law of Bimanual Skill — A right-handed quarterback who is preparing to throw a football plants his right foot, throws his left arm out in the direction of his target and then heaves the ball with his right hand. A left-handed boxer who is preparing to throw a punch plants his right foot, throws his right arm out in the direction of his target and then thrusts his left arm and fist at his opponent. Human beings have two hands. One hand is the dominant or preferred hand. The other is the subordinate or non-preferred hand. In the first example, the quarterbacks’ right hand is his preferred hand. In the second example, the boxer’s right hand is his non-preferred hand. Human beings learn about the difference between their preferred and non-preferred hands early in life, probably referring to them as their strong and weak hands (and arms), respectively. Their use is an area of study that is important to some researchers, and is relevant to research in HCI. Guiard studied the uses of human hands. In every task undertaken that requires their use, each hand has a distinct purpose or use, or a set of uses. Guiard explained how the roles and actions of the preferred and non-preferred hand are different. In Guiard’s formulation, the non-preferred hand leads. It reveals to observers the area in which the preferred hand is going to do its work. It performs “coarse” movements (MacKenzie in Carroll, p. 41). By

contrast, the preferred hand follows, more like the queen behind her pawns on a chessboard than the comfortable king in the rear echelon. The non-preferred hand foreshadows the movement of the rear hand. Baseball pitchers lead with their weak hand in a windup, trying not to reveal their intentions for their strong hand. Noted HCI research by Kabbash cites Guiard's model, which is descriptive, like activity theory, not predictive. Research in this field is important to guiding proper design of hardware (keyboards, computer mice, touch screen monitors, Smartphones and personal digital assistants) as well as software (operating systems and other on-screen programs with graphical user interfaces which users navigate to perform a task. According to Mackenzie, Guiard's work is especially pertinent in the emerging field of 3D graphics.

Web Design

In *Designing Web Usability*, Nielsen (2000) distinguishes between page design, content design and site design. He writes about accessibility for Internet users with disabilities and about serving a global audience. He also makes predictions about the future of Web design. According to Nielsen, the keys to successful page design are simplicity and accessibility (Nielsen, p. 97). At 72 dpi, "still" Web images are not configured to attract much attention. Few users will visit a Web site merely because they heard it has a unique design. They go to Web sites because of the content. They want to access the homepage, get the desired information and leave the site. Simple sites, the ones that allow this, are preferable. Accessibility, which relates to several things but in this case relates to the ability to view a site on more than one computer brand and more than one browser. Nielsen advocates that sites be checked to make sure that they are accessible on two-year-old browsers and that plug-ins and other software — also two years old — work with the site as well. Nielsen concludes that while only about 10 percent of American users have old or low-end hardware and software, to not test for them could result in the loss of 10 percent

of a potential audience. Given the technological constraints of hardware and software in low-income countries, the percentage of old or low-end hardware or software there is likely to be significantly greater (p. 97).

When one designs a trade journal or book, the finished product will be printed and copied many times. Each copy will look virtually the same, until a new edition is published. Only age, weather and overuse can deteriorate the original design, three things that could possibly happen to journals and books in poorly insulated libraries, offices and homes in low-income countries. Designing Web sites in low-income countries is similar, and yet different. In the same way that weather and age can destroy a book, poor or incompatible target-country hardware, software and Internet connections can alter the aesthetics or usability of a Web site. The difference is that the user in the target country using insufficient equipment experiences these design and usability problems from the moment he accesses the Web site. Rather than opening a pristine book and seeing it erode over time, Web users in this situation encounter a site poorly designed for their use and — when financially able — may spend their time and money trying to upgrade the hardware, software or Internet connection that will make the site more aesthetically pleasing and useful. Once the site can be seen in its intended condition, it will likely stay that way for the user, until the developer redesigns the site.

Hypertext markup language (HTML), a system of letters, numbers, special characters and punctuation marks, comprises the underlying language of the World Wide Web. Berners-Lee designed this code, which he hoped would be useful to people around the world. He also hoped it would be scalable. In other words, as technology improved, HTML would remain the underlying code of the Web. He designed a language that is easy to understand and easy to demonstrate results. He envisioned what Nielson calls “semantic coding,” a system whereby any Web

browser on any Internet-based computer could interpret a code in a similar, if not exactly similar fashion. For example, a Netscape Navigator browser on a Toshiba laptop computer built in the mid-1990s reads the <H2> headline code (or tag) differently than the Microsoft Internet Explorer browser reads the “<H2>“ tag on a Dell computer built in 2006. And yet the programmer’s desired outcome is apparent in both instances: a bold headline. Both interpreted the code as setting up for writing text in a slightly larger than normal headline size. But the font, actual point size and leading are determined by how the hardware and browser interpret the HTML code. This is a seemingly meaningless fact that Internet users in low-income countries take for granted, but it is vital to understanding what users in low-income countries see when they access the Internet. Many of these people do not have Dell computers, Pentium chips, Microsoft Windows Vista operating systems or the latest IE browser. It is important that the language of the Internet allow similarly coded documents to look nearly the same when viewed by two people on different continents. As Nielsen writes, “The exact way pages would be shown (or read) to the user would be determined by the user’s own equipment” (p. 36).

Site Design

Web surfers view only one page at a time (Nielsen, p. 164) but how each page is integrated with the next one — and the previous one — is important to the success of a Web site. Imagine a Web site designed for health workers. It promises on the home page to explain treatments for a disease, but those treatments are difficult or impossible to find because of poor site design. Nielsen writes about a study by Spool (n.d.) that shows that users who started at a home page and were given a simple task (try to find a certain page) were only able to find the page 42 percent of the time. This is an unacceptably low percentage for any task, from marketing to medicine, genealogy to grant research. Nielsen emphasizes that Berners-Lee designed the

Web as a place for academicians to read documents. The usability of the Web, he says, “has not improved” nor kept pace with the technology that is now embedded in it, such as audio, video and animation. “Therefore, site design must be aimed at simplicity” (p. 164). Ironically, a good example of where simplicity was not utilized was on the inasp.info home page, where Essential Health Links previously resided. A user attempting to find Health Links could not find a link with that name on the home page (June 2006). Instead, one first had to click on [Health](#) and then click on [Essential health information links](#) to gain access to the links. Such a task may have been easy for someone who is familiar with the INASP site, one that knew the word clues for finding the Health Links page. But new users, those who were unfamiliar with the site, may not have been able to find the Health Links. It would have been better to put a link on the home page that said “Health Links”. The site Healthnet.org, where the links now reside, has an “Essential Health Links” link on its homepage. Here’s another ironic example of low usability: In 2000 a ubiquitous Internet Explorer browser could not print full pages from the Web site for the Usability Professionals Association (upassoc.org). Text on the right side of the page was cut off. Eight years later, the homepage prints without left side navigation and no text is cut off on the right side. These usability experts saw the design flaw and — rather than accept the error as inevitable — they corrected it.

Nielson says successful home pages have search features, because most users are “search-dominant” (p. 168). Indeed, some of the most popular sites on the Web are search engines, such as Yahoo! and Google, so surfers are accustomed to typing key words in rectangular boxes and asking for help. Providing help (as opposed to selling a product) is, of course, the mission of many of the Web sites linked off Essential Health. But do they offer useful search engines for finding content on their sites? Firstly, there are eight medical search engines

that have their own category within the Health Links, from “Diseases, Disorders and Related Topics” to “Yahoo: Diseases and Conditions.” Each site found in Google Scholar is said to represent “a body of scholarly work” (Google Scholar, 2008), perhaps foretelling the end of university libraries as book warehouses, but definitely signaling a need for research into texts and technology.

Helpful Metaphors

Computers are tools. They are what is used to create a two-dimensional image of a product, not the product itself. Computers are the hammers, not the house; the fountain pen, not the Gettysburg Address. If the World Wide Web is an extension of the computer medium, then the *Web site* is the product of the interaction between the Web developer and the programming code; such as between the speechmaker and his text; between the carpenter and pieces of wood. These metaphors are presented to make the point that metaphors play an important role for anyone attempting to describe a new medium. Web developers often have the task of writing link text (or designing image maps) that should be intuitive. Metaphors aid this process (p. 180). It is not uncommon, for example, to click on HOME to go to the beginning of a Web site, or a shopping cart image to make a purchase online. Web developers take common phrases from our everyday language and integrate them seamlessly into our everyday Web lives. We are comfortable clicking on these familiar words that have new meanings. One should be careful not to be too clever and confuse a user by employing metaphors that are not common. Clarity is important when using medical terms on health-related Web sites. But occasional use of metaphors can make some terms easier to understand, and cause the user to click on a link rather than move to another site and miss the first site’s offerings. Many of the metaphors used in health-related Web sites also are used elsewhere on the Web. A few examples of metaphors from

sites linked off Essential Health, used to increase click-through rates, include: library, pressroom, site map and toolkit. None of these words or phrases link to places that we generally think of when we see these words offline. But users have grown accustomed to encountering them online and know what to do when they see them.

Navigation

According to Nielsen, there are two primary tenets in designing Web sites (p. 198). One is that a site has a structure and the other is that the structure matches the needs of the user, not the needs of the organization. A Web site has a good structure if it is presented in a pleasant, logical, readable, navigable manner that makes the user want to use it now, and later as well. As to Nielsen's second point, one should not build a Web site so that it resembles organizational charts of a business. Customers do not go into a bricks and mortar business hoping to see the chairman and chief executive officer at the front door. Nor do Web surfers expect to read bios of these people on a splash page of the company's Web site. Organizations who do not know how to properly design a Web site should hire a consultant, conduct a focus group, or read a dissertation about user interface design. While many corporate Web sites should be designed the way their respective bricks and mortar businesses are organized, Progressive Insurance took the bricks and mortar metaphor a step further. Progressive, which does much of its business online, runs television advertisements in which people walk inside a building and purchase boxes of insurance in the same way they can buy boxes of cereal at a grocery store. In this case, Progressive is stressing in its advertising that the Web-based business is run like a bricks and mortar corporation.

What elements make for poor site structure? Are sites hurt by too much text or too little

text? Are users turned off by too many images or too few images? What is more problematic? Too much color or not enough color? The point is that it all depends. Two health-related Web sites linked off Essential Health may have similar site structures, because both are intended for health care audiences, but they definitely would have different structures than Disney.com, for example. Successful Web developers study the differences in organizations' needs and design their respective sites accordingly.

Elements of a Successful Web Interface

There are a number of guidelines one should follow in an effort to build a successful Web interface. Other sections of this research deal with the health field (the vertical dimension or topic of these Essential Health sites), the health-related content and the issues related to intercultural communication. This section concerns the technological considerations when building Web sites to be viewed by health workers in low-income countries. Nielson and Tahir (2001) offer 113 "guidelines" for assuring home page usability. This section will list and explain the guidelines among that long list which the author deems pertinent to the current discussion. The first (p. 10) is that the company name or logo be in a reasonable size and noticeable location. A company's logo, according to one Web site, is like a "Corporate Fingerprint" and should distinguish a business from its competitors through "visual memory" (Alomani Q8 Productions, 2008). Another site suggests that logos should not only be recognizable but also should create an "emotional bond" between the company (or organization) — the source — and the user or customer — the target (Cimperman, 2008).



Figure 13. The World Health Organization logo

This World Health Organization logo (Figure 13) appears on countless pages on the WHO Web sites, which are linked off Essential Health. The WHO logo is an example of a corporate fingerprint that is highly recognizable, with its use of a variation of the caduceus symbol, a staff with a snake wrapped around it. This universal symbol is an indication to most users that content on the site is related to health. It should be the goal of developers of every organization's site to put an organization's logo on every page. It also is a good practice to make the logo an image map that links back to the organization's home page. Oddly, the page that is referenced above, from the Alomani Q8 Web site, which touts the importance of logos, does not itself include an Alomani Q8 logo.

Nielsen and Tahir next state (p. 10) that a home page should "include a tag line that explicitly summarizes what the site or company does." A good example of a site following this rule is that of the Karolinska Institutet, a Swedish medical school. This site is listed by Essential Health Links as a search engine for "Diseases, Disorders and Related Topics," a fact which is magnified by text on the home page. Those who enter the site for the first time without navigating from the Essential Health Links home page might realize right away that it is a search engine, because of the phrase "Find books, journals and articles" on the home page (Karolinska

Institutet, 2008). Sometimes the tag line can be used by the Web developer to spell out an acronym, as is the case with the RHINO Web sites linked off Essential Health. RHINO is an acronym for the Routine Health Information Network, which includes “routine health information” such as patient records, epidemiological surveillance data and “vital statistics” such as mortality rates (Essential Health-RHINO, 2008). Whereas the names of some sites say exactly what they do, such as “Clip Art for Health Communication,” others have “humorous” names and lack text to explain what they do. However, it is difficult to find a site linked off Essential Health that does not have a name in its logo, or text near the logo — or both — that does not sufficiently explain what the site does. Many of these sites are niche “publications.” They want readers to know instantly that their primary topic is AIDS, for example, not malaria.

Nelson and Tahir also recommend (p. 11) that Web developers “clearly designate one page per site as the official home page. It is important that the home page be designated as such on that page — through font size and page design — and that links to the home page are clearly marked on other pages. A check of sites linked off Essential Health shows that some organizations (Karolinska Institutet, SCIRUS) do not use the term “Home” anywhere on their home pages, while others do (Google Scholar, HONCode Toolbar).

The authors further recommend (p. 11) that the home page be designed in such a way that it looks somewhat different from the other pages on the same site. The home page is similar to the front door of a house. Not only should it look inviting to users (home decorators say a front door’s color should “pop”), but also it serves a function of quickly letting the user know that he has returned to the main page of the site. This can be done with images, colors or backgrounds, or tables that are a different size than the rest of the site. Since the page will probably contain a logo or some other identifying feature at the top that also is at the top of the

other pages, there is little fear that users will think they have left the site.

It also is recommended (p. 12) that corporate or organizational information be grouped on one page, an About Us page. This page gives users an overview of the organization. A link to this “About (Company Name)” page should be grouped on the home page with links that refer to the organization’s press releases, employment information and contact information. The About Us page should include some form of feedback mechanism, either an e-mail link or a window to type a message in — with a submit button. Feedback is an essential function of any Web site. Users expect it and it also is a key element of the digital research cycle.

Another guideline (p. 12) is that Web developers should prominently display links to the organization’s most important functions, so that users can find them and click on them quickly. An example of an organization linked off Essential Health whose Web site does this well is AEGIS.com. The home page of this site, which provides information about HIV/AIDS, is divided into four areas: there is a frame with links over a blue background in the left rail. The rest of the page contains, top to bottom, numerous informational links. At the top is a link about an upcoming AIDS Walk. It has a yellow background. Below that is the area that stands out the most: AIDS-related news from the Agence France Presse that is shown in five languages. By clicking on small national flags/image maps under the header, each of these five separate reports can be accessed (AEGIS). Another site linked off Essential Health that displays important information prominently is titled “Neuroscience on the Internet”, which is edited by Neil A. Busis, M.D. Simply put, the existence of a search engine window at the top of this site’s home page is a clear indicator that the site’s most important function is to provide quick information about neurology (Busis, 2008). An organization that does this poorly is the Centers for Disease Control and Prevention in the United States Department of Health and Human Services. The

CDC's site dedicated to the Division of Tuberculosis Prevention does not "emphasize the highest priority" as Nielsen and Tahir wrote (p. 10). Rather it contains a narrow left rail with a gray background and blue links, next to a wide rail with a white background and blue links. Nothing stands out on this page (Centers for Disease Control and Prevention, 2008).

Fundamental Errors in Web Design

How health workers in target countries interact with Web sites dedicated primarily to these countries depends largely on how the sites are built. One of the primary tasks of a Web developer is to ensure that a site is built in such a way that it will be deemed usable. Nielsen writes about six fundamental errors in Web design (Nielsen, 2000, p. 15):

Business model — Treating the Web as though using it does not represent a "fundamental" or paradigm shift within a company or organization. Leaders of non-profit organization must approach their Web sites — and construction of them — as signs that the organizations' business practices are forward thinking. This philosophy is easier for adopters to spread in an organization in 2008 than it was for early adopters in 1996, when Web sites were not seen as essential, as they are today.

Project management — Treating a Web site as a company-driven, not a customer-driven device, with features preferred by the end user. Input from the customer is a good thing, and made much easier to achieve by tools on the Web, such as feedback. But organizations that give customers what customers say they need, on the Web, will succeed faster and more often than organizations that do not.

Information architecture — "Structuring the site to mirror the way the company or organization is structured" (p. 15). The posting of a Web site is a radical remediation from

hardcopy publishing and the business model of an e-commerce site is quite different from that of a bricks and mortar store. A Web site is like a showroom of a business. How its database is modified should be considered as significant as modifications to a print catalog or a building that houses a retail business.

Page design — Privileging in-office demonstrations of a Web site, which tend to be biased in favor of the product, over impartial usability tests involving end users, sets a bad precedent. A representative of an Internet service provider should not, for example, demonstrate “how to surf the Web” on a T1 line in the ISP office if the customer will be using a standard telephone line at home. The sites will load much faster in the office. Similarly, a Web site or Web-based software being introduced to potential users at a medical conference should not be demonstrated during an offline PowerPoint demonstration. If an Internet connection is unavailable, at the very least the prospective buyer should be told of the software’s limitations and how the Web site loads in a low-bandwidth environment.

Content authoring — Generating content in the same “linear” method as in traditional copy writing. Content on the Web is best presented in a non-linear fashion. It would be natural for someone who is shoveling information — already in hardcopy journals — onto the Web to present it in the same linear fashion as the journal. But the result will be an online product that does not take advantage of the Web’s many assets, such as audio, video, graphics, animation and links. As mentioned above, making this transition was easier in 2008 than in 1996, but because of the specialized nature of medical information, many content providers may be reluctant to change the format to a non-linear one. This is a recipe for disinterest and Web-site failure.

Linking strategy — It is important to acknowledge that your Web site is merely one of millions, to take time to link the site to other sites and to acknowledge that others are linking to yours (by keeping your site updated). The Essential Health Links site accomplishes this goal.

Research about Dissertations

Dissertations do at least three things. They show how much a student has learned about a subject. They add to the literature about that subject and they fulfill one of the requirements for receiving a doctoral degree. Earlier this decade the University of Central Florida began mandating that all forthcoming UCF dissertations shall be published as Portable Document Format (PDF) documents rather than as bound hardcopies. The decision saves paper and ink, saves library storage space and acknowledges a central tenant of American culture in the 21st century: the decision to “go paperless.” Whether one is working for a small business whose revenues are down — or writing the next great American novel — there is a desire to contemplate completing one’s task by using as little paper as possible. The decision is a nod to environmentalists, who want to save trees, but it is also a nod to futurists, who recognize that hearing Shakespeare performed on an iPod is not a bad thing, and it is an inevitability. These issues are relevant to anyone using the digital research cycle to study dissertations. Does publishing a dissertation online require that the subject matter be changed in any way? What about the textual style? Should a dissertation completed in 2008 be written differently than one completed in 1998 because it is to be published as a bookmarked PDF? Does the ability to publish the dissertation online change the potential audience? It certainly increases the size of the potential audience, because more people will be able to view it online than can find it in a library. What are the other implications of publishing a dissertation as a PDF? The dissertation

becomes searchable, a feature not available with hardcopy books. Switching from bound, hardcopy dissertations to PDFs probably did upset some traditional professors and students at UCF, but the format of the final PDF product is still quite similar in appearance to that of a hardcopy. Over time, as researchers at UCF and across the country explore the results of converting the first dissertations to PDFs, perhaps there will be a call to adopt more different ideas, such as allowing students to — or mandating that they — post their dissertations online as Web sites. For research about this subject to be useful, it would be helpful for someone to conduct research as soon as possible about the implications of these first PDF-based dissertations. A baseline is needed, from which one can make future comparisons.

Research Project in Uganda

The next section includes a proposal for a research project mentioned above regarding working at a health clinic in Uganda, and the subset of projects that could emanate from it. The research could include aspects of health care issues in low-income countries, and health communication. The impetus for the project is this researcher's two trips to Uganda, in the summers of 2007 and 2008. When I began taking classes in the Texts and Technology program in 2002, I had a desire to someday use texts to promote technologies that help people or, alternatively, use technology to distribute texts that help people. It is believed that with this project one can do both. However, because the desire to be a change agent — whom [Rogers \(2003, p. 27\)](#) says steers others to adopt innovations the agent promotes — is strong, careful attention will be taken to separate efforts to help others (promote change) from efforts to research issues objectively.

Healthcare in Low-Income Countries

Grant Objective

This researcher received an e-mail from UCF Texts and Technology program coordinator Tison Pugh, Ph.D., in December 2008, containing information about a [Request for Applications \(RFA\): Africa-U.S. Higher Education Initiative Planning Grants](#), dated Nov. 19 and issued by the United States Agency for International (USAID). Higher Education for Development (HED), an arm of USAID “anticipates making 20 awards of up to \$50,000 for a five-month period, contingent on the approval of funding” by USAID. The e-mail states that the awards “are intended to support planning for long-term partnerships to strengthen the capacity of African higher education institutions in the areas of 1) agriculture, environment and natural resources, 2) health, 3) science and technology, 4) engineering, 5) education and teacher training/preparation, and 6) business, management and economics and increase the engagement of U.S. higher education institutions in Africa” (United States Agency for International Development, 2008). This researcher would like to propose to USAID a project involving health and education/teacher training. It would be ideal future research emanating from this dissertation.

The official USAID proposal is due Feb. 2, 2009. The proposal below — written prior to the deadline as part of this dissertation’s future research — will help this researcher and others elucidate how best to compose the USAID proposal. It contains three sections: 1) The need for more and better primary health care in Uganda; 2) The requirements for successful development in Uganda; 3) Ideas for the official proposal — how to use the USAID grant money to meet USAID’s goal of improving the scope of African higher education institutions in health care.

Better Primary Healthcare

A French scientist, Luc Montagnier, 76, who shared the 2008 Nobel Prize for Medicine, says researchers are on the verge of eliminating the transmission of AIDS. It could happen within his lifetime (Cox, 2008). Montagnier, who is director of the World Foundation for AIDS

Research and Prevention, stated at the award announcement that ending transmission of AIDS would make it a disease much like others. “Our job, of course, is to find complementary treatment to eradicate the infection. I think it’s not impossible to do it within a few years,” Montagnier said. “So I hope to see in my lifetime the eradication of, not the AIDS epidemic, but at least the infection. This could be achieved (Cox, 2008).

If Montagnier is correct, this is good news for the world, but especially for Uganda, where the national HIV prevalence rate among adults (ages 15-49) is 5.4 percent, and some 940,000 adults and children (ages 0-49) were living with HIV at the end of 2007. There were 77,000 AIDS deaths (adults and children) in 2007 and 1.2 million AIDS orphans at the end of 2007 ([President’s Emergency Plan For AIDS Relief, 2008](#)).

Requirements for Successful Development

Successful development in East Africa requires meeting three goals: Affordability, Accessibility and Sustainability. Meeting these goals would help ensure the success of a primary health care project in a low-income country such as Uganda. Affordability — The average per capita household income in Uganda is approximately \$300 per year. Because Ugandans have so little income it is important to make health care affordable to them. It is a belief among health workers there that Ugandans should be charged something minimal for services rendered by health workers — for cultural reasons — but not much. Some health operations — such as the Bishop Masereka Christian Foundation Health Centre and the Kakatunda Health Centre — charge for medications dispensed. But they do not charge for patient care provided directly by health workers. Care for AIDS patients is crucial in Uganda, which has a high population of young people. The United States Government’s President’s Emergency Plan For AIDS Relief

(PEPFAR), an initiative of President George W. Bush, helps AIDS patients receive health care services at no cost (Hutton, 2006) by funding local and international NGO to provide free antiretroviral therapy (ART). PEPFAR distributes its funds to 15 countries, including Uganda. These countries comprise approximately 50 percent of the world's known HIV infections (President's Emergency Plan For AIDS Relief, 2008). Uganda received more than \$90 million in PEPFAR funds in 2004, more than \$148.4 million in 2005, almost \$170 million in 2006, nearly \$237 million in 2007 and more than \$283 million in 2008. The funds were used to support a three-pronged HIV/AIDS program: prevention, care and treatment. As a result of PEPFAR, more than 145,000 Ugandans began receiving ART. Some 414,500 received some kind of service in 2007; 307,800 orphans and "vulnerable" children received assistance in 2007; some 1.2 million pregnant women began receiving HIV counseling and testing services for preventing mother to child transmission (PMTCT); and 62,400 HIV-positive pregnant women began receiving antiretroviral prophylaxis for PMTCT. There were 1.5 million counseling and testing "encounters" (other than PMTCT) in 2007; and 7.1 million people were contacted through community outreach HIV/AIDS prevention programs in 2007. These programs promote abstinence and/or "being faithful." Some 1 million people were contacted through community outreach programs that endorsed condoms and other transmission prevention methods. More than 115.4 million condoms were shipped to Uganda from 2004-2007 (President's Emergency Plan For AIDS Relief, 2008).

Affordability also can come from cost savings. One of the things that make health care in Uganda affordable is the use of patients' relatives — in many cases — to provide low-level nursing. Reducing that cost burden by eliminating services that would normally be performed by a certified nursing assistant-level employee or other hospital worker reduces costs. This

customary practice probably should continue even in well-funded Ugandan hospitals because funding is not always sustainable. However, when Ugandans become Westernized, expectations rise that paid, professional nurses should provide a wider array of care. Bernadette Kahembwe, a Ugandan mentioned above who has lived in Scotland, became incensed when nurses seemingly ignored her sister, then a patient in a Ugandan health care facility. Their actions led Kahembwe to seek to build a health clinic in Uganda.

Accessibility — Simply put, transportation in Uganda is problematic. A member of parliament told this researcher that successful development projects meet his countrymen at the point of their need. But a lack of infrastructure often makes this impossible. Many Ugandans live on land they own that is not near infrastructure, through no fault of theirs. Operators of successful development health projects in Uganda, the MP said, build health clinics that are close to roads, clean water and electricity, but not close to other clinics. In a country where many rural roads — and some major ones — are made of clay or dirt, some health clinics use motorcycles to visit patients who live in the hills and valleys and may be too sick to go to the clinics. Another consideration regarding accessibility is caring for the Ugandan people who live on the many islands of Lake Victoria. Their access to health care is limited by their poor ability to travel to the mainland. Most of the island residents live near the landings, where the boats arrive. Some years ago the Ugandan government had a boat from which health workers provided health care services as they traveled from island to island. But that program was deemed too expensive and not sustainable.

Sustainability — PEPFAR funding is a significant step, but it will not remain forever, particularly in these tough economic times. Thus it is important for organizations running health clinics in Uganda to be funded by the hundreds of durable non-governmental organizations

(NGO) such as the Gates Foundation, which funded, among other projects, the [African Youth Alliance \(2005\)](#), which provided sexual and reproductive health information and services, the Evaluation of the African Youth Alliance Program in Uganda ([JSI Research & Training Institute, Inc., 2007](#)), and anti-malaria efforts ([Dugger, 2006](#)). But not every effort is working. For example, Dugger reported in 2006, “In Uganda, population 28 million, not one of the 1.8 million [mosquito] nets approved more than two years ago by the Global Fund to Fight AIDS, Tuberculosis and Malaria has yet arrived.” Dugger also reports that the World Bank, a large intergovernmental organization (IGO), reduced its staff working on eradicating malaria to zero employees six years after pledging to cut malaria deaths in Africa in half (Dugger, 2006). Sustainability is only achievable if programs such as these are run honestly, this information shows.

Amir Attaran, a law professor at the University of Ottawa and a vocal advocate on malaria issues, testified at a 2005 U.S. Senate hearing that the USAID “was too cozy with ‘the foreign aid industrial complex’ ” ([Dugger 2006](#)). Managers of the present project, as described below, will make every effort possible to ensure that we do not become cozy with the same group. One method for ensuring that this does not happen is to have a strong Ugandan board and a strong American board, as is the case with the Bishop Masereka Christian Foundation (BMCF). However, having a faith-based focus does not always ensure propriety in the management of foundations and non-profit organizations.

CHAPTER FIVE

Health and Human Services

The federal Department of Health and Human Services publishes a Web site (2009) with Research-Based Web Design & Usability Guidelines. This large Web site includes 18 chapters,

covering everything from the Web site design process (and evaluation) to navigation to usability testing. Some items in the survey herein relate to the topics of these chapters: links (Chapter 10, item No. 2); graphics, images and multimedia (Chapter 14; item Nos. 15, 19); writing Web content/content organization (Chapters 15-16, item Nos. 1, 2, 7 and 11).

National Library of Medicine

The U.S. National Library of Medicine (2008) created an audio slideshow that helps people distinguish between good and bad Web sites. It includes questions a user might ask before dedicating time to a site, not questions a Web developer might ask. Most questions listed on the slideshow are not topics addressed in the 23-item questionnaire. Rather than focus on the site sponsor's attitudes, they focus on his identity, his purpose, his motives and his funding. In the case of these Web developers, one would want to know if the site sponsor is a Web developer with a professional Web design background, a Web developer with no professional Web design background, a Web developer with a professional medical background or a Web developer with no professional medical background. Who is his target audience and what purpose does he have for seeking that audience? Will his motives be pure? Will he protect the privacy of the patients invoked on the site? More than 85 percent of respondents (or 30) agreed with the statement, "It is important that these Web sites include disclaimers, about confidentiality of data and patient rights, when appropriate." These respondents understand the importance of a safe user experience. While the respondents value the privacy of patients they also value the privacy of users, as only 6.2 percent of the respondents (or two) agree with the statement, "It is important that these Web sites require registration." NLM suggests that before a user registers, he or she should look at the site's privacy policy.

Knowing who writes the site also is important because that helps the user know if the information is of high quality. More than 82 percent of the respondents (or 29) agree with the statement, “It is important that these Web sites contain high quality health care content.” The slideshow states that “phrases such as ‘editorial board,’ ‘selection policy,’ or ‘review process’ can point you in the right direction.” One respondent commented, “It’s important for any site to contain high quality content.” When a site makes claims of high quality, it should back them up. More than 73 percent of the respondents (or 25) agree with the statement in item No. 1 that “It is important that the Web sites . . . include a link to some sort of verification that the site contains accurate content.” Like NLM, the respondents believe the sites should be accountable for their claims.

NLM points to a Web site for the Physicians Academy for Better Health, which stresses that it only includes content “that meets their rules for quality” (National Library of Medicine). NLM also encourages users to know when they are being encouraged by a site to buy something. The NLM asks, “Who runs the site? Why have they created the site? What do they want from you? Who is paying for the site? Does the site’s information favor the sponsor? Do experts review the information? Is it up to date? Where does the information come from? Does the site make unbelievable claims? Do they want your personal information? What will they do with it? The first five questions address the site developer and his motives. The next four questions address information on the site. The final two address the site developer’s motives. More than 91 percent of the survey respondents (or 32) agree with the statement, “It is important that these Web sites maintain a tone best described as objective.” The respondents appear to agree with NLM that it is important to assess a site developer’s motives, although one commented, “[I]t is impossible to completely avoid bias.” NLM asks users to look at a Web site’s “tone” and ask

themselves whether it is “too emotional” or “too good to be true.” NLM also pans sites that include outdated information.

Cultural Markers

More than 94 percent of the respondents (or 32) agree with the statement, “Information on these Web sites should be written in such a way that the target audience understands it completely.” More than 90 percent of respondents (or 29) agree with the statement, “It is important that these Web sites be usable by people for whom English is a second language. The respondents appear to value the culture of their users or at least value providing their users with sites that do not present cultural barriers.

Sun (2001) addresses the cultural “markers” in Web design. Markers are all the elements of a Web site that can be interpreted differently by different people. Sun lists 15 categories he found in a table he cites from Barber and Badre (1998): HTML specific, icons/metaphors, colors, specific colors, grouping, flag, language, geography, orientation, sound, font, links, regional, shapes and architecture. Each of these categories can contain from two to 19 markers. Examples include — Sound: Music, voice; and Flag: Native, foreign, multiple. Sun’s emphasis is on the “four major categories of cultural markers: language, visuals, colors and page layout” (Sun). He defines them this way:

Language denotes the local language for the target audience. Visuals are pictures and graphics related to the local culture which include different categories of icons/metaphors, flag, geography, regional, shapes, and architecture in Barber and Badre’s table. Colors are primary colors in the Web page design. [And p]age layout is the display layout that directs scanning information and mirrors the logical flow of task (Sun, 2001).

Researchers at Michigan Technological University conducted three usability tests during April 2000, with the help of three graduate students, ages 30-33, from Germany, China and Brazil, who speak German, Chinese and Portuguese, respectively. Among Sun's findings: Typical Web navigation lacks "context clues," visual indicators of where the user is on the site and where she can go. Cultural markers such as those mentioned above "provide users with situational cues." With them, users can interpret information within their own cultural context. Such markers, Sun says, "are an efficient and effective strategy to address local audiences and increase the cultural sensitivity of multilingual websites if used appropriately" (Sun, 2001).

Homophily

Homophily, the amount a target identifies with a source, is a topic in the survey. More than 76 percent of the respondents (or 27) agreed with the statement, "It is important that the target audiences of these Web sites be clear to the sites' users." By agreeing with the statement, respondents are saying it is important that the users recognize when they are or are not the target of the Web developer. Those who are the developer's target may develop homophily or identify with the developer. Credibility, or how much a source is trusted, also was a topic on this questionnaire. More than 73 percent of respondents (or 25) agreed with the statement, "It is important that the Web sites linked off Essential Health Links — such as mine — include a link to some sort of verification that the site contains accurate content." Wang, Walther, Pingree and Hawkins (2008) compared Web sites and online discussion groups on credibility and homophily. One hypothesis was that, whether or not health information on the Web is credible is determined by whether it is "positively associated" with how the information is evaluated and how much influence it has. This hypothesis was supported. Those who gave high scores to information garnered on the Web site also perceived greater levels of credibility for the Web site. They were

more likely to “act on the advice offered in that particular message” (Wang, Walther, Pingree and Hawkins). Those who gave high scores to information garnered on a discussion group also perceived greater levels of homophily for the discussion group. They were more likely to “act on the advice offered in that particular posting” (Wang, Walther, Pingree and Hawkins).

Target Audience

Should the source that builds the site be familiar with the culture of the target audience? Bias, Prentice, Fletcher, Vaughn and Moore (n.d.) conducted

[a] three-phased usability evaluation of a health Website (that) revealed a total of 41 usability problems, plus some performance data (e.g., time on task), to help drive a user-centered design that would better serve the site’s intended user audience (low-literacy, low-computer-literacy, non-native English speaking residents in 38 south Texas counties) (Bias, Prentice, Fletcher, Vaughn and Moore (n.d.).

They found that designers or developers who are not representative of the user audience for the site they are building should undergo training in user-centered design. This could help users for whom English is not a second language, help that the questionnaire respondents believe is necessary. More than 90 percent of the respondents (or 29) agree with the statement “It is important that these Web sites be usable by people for whom English is a second language.”

Feedback

Writing in June 1998, Fuccella and Pizzolato of International Business Machines (IBM) stated that companies did not invest enough money in the usability of their Web sites. Sites that do not meet the needs of users ultimately fail to meet the expectations of the companies, they said. They proposed building Web sites based on “user expectations and feedback,” a method that had been employed at IBM, in the design and construction of both Internet and Intranet sites.

The authors lauded the fact that the methodology led to one particular success, that the “structural framework” of IBM’s Java site had been in place for 10 months, with no changes planned. Ten months in Internet time was a long interval in 1998 when so many changes were happening so quickly to the Internet and its World Wide Web. The authors stated that companies do not demand that their sites be user friendly because they do not know to expect it and because most Web developers do not “offer that service.” Ten years later the reverse is true. Managers know their Web site users — customers — demand user friendly Web sites and they demand it too, not only of the Web design vendors they hire but also of the Web developer and information technology departments in their own companies. That is why more than 97 percent of respondents (or 34) agreed with the statement in item No. 9, “It is important that these Web sites include a mechanism for providing feedback, such as a Contact Us page with an e-mail link back to the site manager;” and why more than 91 percent of respondents (or 32) agreed with the statement in item No. 11, “It is important that these Web sites carefully consider prior feedback from users when updating the sites’ textual content,” and why more than 82 percent of respondents (or 29) agreed with the statement in item No. 15, “It is important that these Web sites carefully consider feedback from users when updating the sites’ graphical content.” In other areas of this chapter, site users are advised to learn about the sites’ sponsors. Here the authors advise Web developers to learn about their users. “As with software interface design, the ability to create usable and useful Web site designs is highly dependent upon the availability of a crisp audience definition,” they write. Define the audience by conducting user surveys. Then learn more about the content on the site. That is especially good advice if the developer is a vendor. The third step is to “organize and structure the Web site objects” that the second step revealed. It can be added that the developer should also learn how best to employ the technology or

distribution method (the World Wide Web) and to choose a textual style. Focusing on these four variables is a smart way to conduct Web design, just as it is a useful way to conduct other research.

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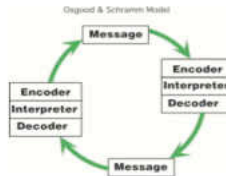
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