The Digital Divide in Health Education: Myth or Reality?

Michael Stellefson, Beth Chaney, and Don Chaney

ABSTRACT

Although e-health interventions provide new opportunities for health education, there has been cause for concern regarding the purported information technology gap between those who have access to digital applications and those who do not—termed the "digital divide." The literature suggests, however, that this divide may now be illusory, driven primarily by a myriad of societal divides such as income, education, and literacy inequities. Such disparities may be the true propagators of what is now becoming a mythical digital divide. The purpose of this article is to identify the evolutionary nature of the digital divide and speculate as to how and why it has become a mirage in today's increasingly technological world. Based on this discussion, suggestions are made regarding how health educators can enable the use of technology to better health through the study of consumer health informatics and e-health behavioral support.

BACKGROUND

Rapidly evolving technology has given researchers and practitioners in health education opportunities to create innovative interventions that were not possible before the birth of the digital age. Web-based interventions have proven particularly useful, as the use of the internet as a communication device has proliferated with time. As reported by Miller and West,[1] the number of Americans using the internet for health care has nearly doubled since 2000, making a significant impact on the health care process.[2] The internet and computer technology are resources that guide health education and have the potential to enhance patient decision-making and self management of pre-existing health conditions.[3] In fact, the U.S. Department of Health and Human Services recognizes the potential of the internet and specifically addressed its use within *Healthy People 2010*. Priority area 11 of that document specifically made reference to internet access in the home, quality of health education internet resources, and design, implementation, and evaluation of technology-delivered health communication interventions.[4]

Although technology-mediated interventions provide new avenues for health information dissemination and health service delivery, there has been cause for concern that an information gap may exist between those who have access to digital technology and those who do not—referred to as the "digital divide." To limit this divide, health education researchers and practitioners have been called on to advocate increased functional access to the internet and recognize digital inclusion as a requisite aspect of physical, social, and mental health.[5,6] Although enhanced digital access may be integral for sustaining the future of technology in health education, access alone may not expand an individual's exposure to health information on the internet. Rather, digital access *and* digital retrieval skills are both necessary to enhance health information processing.[7] Because of this, health educators interested in technology applications are directed to "start where the people are" in terms of health knowledge and technological expertise "in order to help them access information technology in a manner that is appropriate, effective and respectful of their individual and collective needs and perspectives."[5(p528)] Thus, a formative step in developing technology-based health interventions is enabling individuals to access health information transmitted through technology—not simply providing access to technological resources.[8]

The discussion of digital inclusion as it relates to health informatics begs the question: Does the digital divide (as characterized above) act as the underlying real-

Michael Stellefson is a doctoral candidate in the Department of Health and Kinesiology at Texas A&M University, 119E GRW, MS 4243, College Station, TX 77843; E-mail: mstell@hlkn.tamu.edu. Beth Chaney is an assistant professor in the Department of Health Education and Promotion, East Carolina University, 3205 Belk Building, Greenville, NC 27858; E-mail: chaneye@ecu.edu. Don Chaney is an assistant professor in the Department of Health Education and Promotion, East Carolina University, 2302 Belk Building, Greenville, NC 27858; E-mail: chaneyd@ecu.edu.

ity propagating inequities related to health information technology access? A number of technology initiatives were enacted in the late 1990s to help eliminate the digital divide, and they were deemed successful.[9] Indeed, as a result of these initiatives and others,[10] it has been suggested that the difference in technology access and usage among underserved segments of the population is beginning to narrow.[11] This being known, one still often hears the phrase "digital divide" defined as a problem due in large part to inadequate and unequal access to technological resources. However, as new technological innovations are being developed each year, and new initiatives are enacted that provide underserved populations with technological novelties, the idea of digital divide may be transitioning from an issue of access to one of usability.

PURPOSE

Because the transformation of the digital divide has yet to be widely recognized or discussed, the purpose of this article is to outline the divide's evolutionary nature and speculate as to whether the phrase has become simply another buzzword describing a now illusory phenomenon. Based on this supposition, we propose suggestions to guide health educators in developing research and practice agendas that use technology to better health.

ORIGINS OF THE "DIGITAL DIVIDE"

The idea of a digital divide came to fruition in the mid-1990s. Typically, the term referred to a lack of internet access among racial and ethnic minorities, persons with developmental disabilities, those of low socioeconomic status, and/or those living in geographically remote areas of the country. The phrase also encompassed contextual issues such as access to technological hardware and software, and the skills, resources, and literacy necessary to operate and benefit from digital applications. With regard to health issues, underserved populations were particularly affected by the digital divide because they only received limited health care resources and services by way of tele-communications technology.[8]

At the time, health service providers felt pressure to address digital divisions, as these types of inequalities were exacerbating already rampant health disparities. The Advisory Committee on Consumer Protection and Quality in the Health Care Industry[12] put out a call suggesting that telemedicine and related "e-health" innovations be assessed as approaches to improve access to health care. The term e-health refers to an individual's interaction with an electronic device or communication technology in order to access or receive information, direction, or support on matters pertaining to health.[13] The idea of e-health was extended to include the concept of e-health literacy, which refers to the ability of individuals to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem.[14] Within the realm of these definitions, e-health service delivery began to be explored. Since the late 1990s, health educators have been examining the effectiveness of e-health interventions designed for individuals suffering from a wide range of health problems.[6] Many e-health initiatives have identified the internet as the telecommunications vehicle of choice.

INTERNET USE

Internet surveys reveal that health information is one of the most cited reasons for searching the internet.[15] Since the internet is the predominant system of networks used to enhance health informatics and communication, it is important to assess its usage patterns among Americans. Recent reports indicate that 68% of American adults use the internet.[16] The percentage of adults who do not have access to the internet has remained relatively steady from 2002 to 2005. Overall, however, there is a trend towards increased access across most demographic variables (Figure 1). Unfortunately, adults over the age of 65 and those with less education continue to lag with respect to using the internet.[16] In fact, older adults are the least likely segment of the population to use it. This is perhaps due to the anxiety that older adults experience w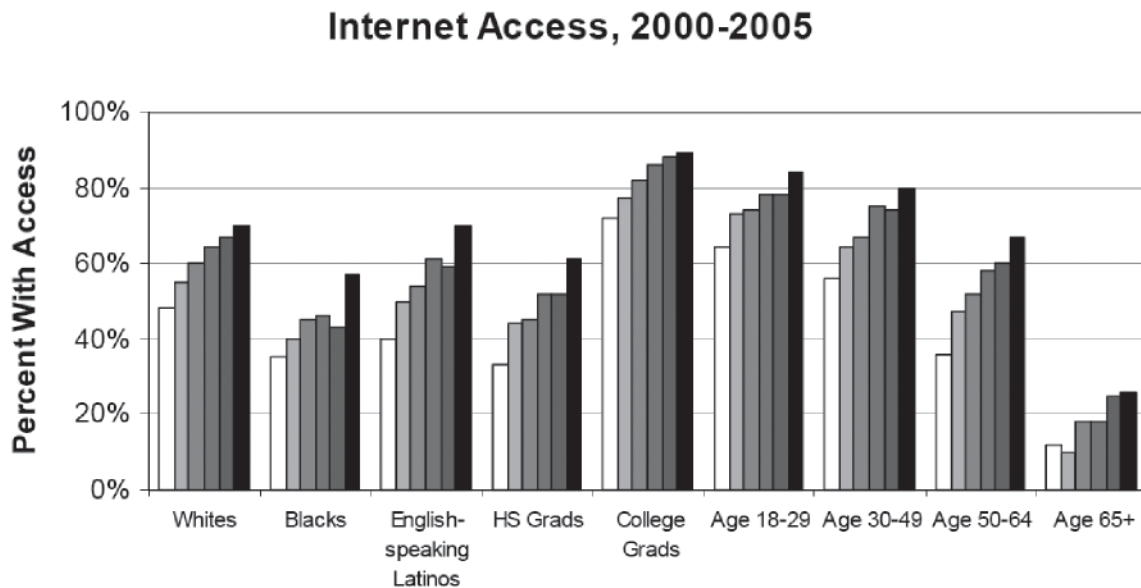hen using computers and other digital applications.[17] (Interestingly, cell phones are an exception—the rates of cell phone use are far higher than internet use among older adults.[16]) In the future, baby boomers will likely continue their already common trend of internet use,[18] thus reducing the disparity of internet use between young and old.

Internet connection speed, rather than experience using the internet, has become a more important factor in predicting regular internet use. Differential access speeds now separate internet users more definitively, with 40% having modest connection capability and 33% having faster broadband access.[16] The incongruence between access speed capabilities has created an entirely different divide, one that stretches across various demographic variables (see Figure 2). Moreover, people who are less likely to have internet access are less likely to upgrade to faster broadband speeds.[16] Because education and household income are positively correlated with internet access speed, higher-income households that possess faster internet access tend to use the internet for health more often than lower-income households.[19]

Studies have been inconclusive in reporting differences in internet use among racial, ethnic, and minority groups. Racial minorities are among the fastest-growing groups of internet users,[20] yet African Americans are less likely than Whites to use it on a regular basis.[16] While some studies have found English-speaking Hispanics to be as likely as non-Hispanic Whites to use the internet,[16] others have found significant disparities between Hispanic and non-Hispanic use.[21] Lorence, Park, and Fox[22] examined whether there were distinct web-seeking differences, with regard to health information, among subgroups within digitally underserved populations. When controlling for potentially confounding variables such as education and income, racial and ethnic internet use disparities disappeared. This confounding effect of education and income on racial and ethnic internet use disparities has also been illustrated in other nationwide studies.[1,23] In effect, as mentioned by Miller and West,[1] the only study to identify a statistically

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Figure 1. 2000-2005 Access Rates Across Various Demographic Variables

Internet Access, 2000-2005

Source: Fox S. Digital Divisions. Washington, DC: Pew Internet and American Life Project; 2005.

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significant relationship between website use and race and ethnicity,[24] failed to control for potentially confounding factors, specifically education and income. Thus, when taking into account income and education levels, race and ethnicity may not be critical factors predicting the use of computers, the internet, or online health information. Furthermore, income itself persists as the major factor impeding access to technology.[25] This being the case, it is important to note that once low-income populations gain access to the internet, their behavior patterns on the web are similar to those of high-income populations.[26] Surprisingly, among non-users of the internet, only 5% say that getting access is too expensive, while almost 70% profess an interest in gaining access.[16] Clearly, more research needs to examine associations between income levels, interest in using the internet, and access to the internet.

Users of the internet who possess high levels of education regarding health tend to be the predominant users of health websites. Those who struggle using the internet and have limited education on a specific health topic tend to shy away from attempting to use the internet to locate health information.[27] Acuity with regard to searching for, accessing, and evaluating health information is an underlying predictor of information acquisition on the internet.[28]

At the same time, the internet is highly commercialized and tends to mediate widely held ideas and values prevalent within societal trends.[29] For example, privately operated websites are more likely to display health information serving their own private cause, rather than a public cause or society at large. As such, Miller and West[1] assessed associations between personal characteristics and the use of public versus privately operated websites to locate health information. Findings indicated that individuals were more than twice as likely to visit private websites to find health information. Kakai and colleagues[30] found that Japanese patients sought health information from commercial sources more often than scholarly sources. In light of these findings, we must examine the great potential for inaccurate health
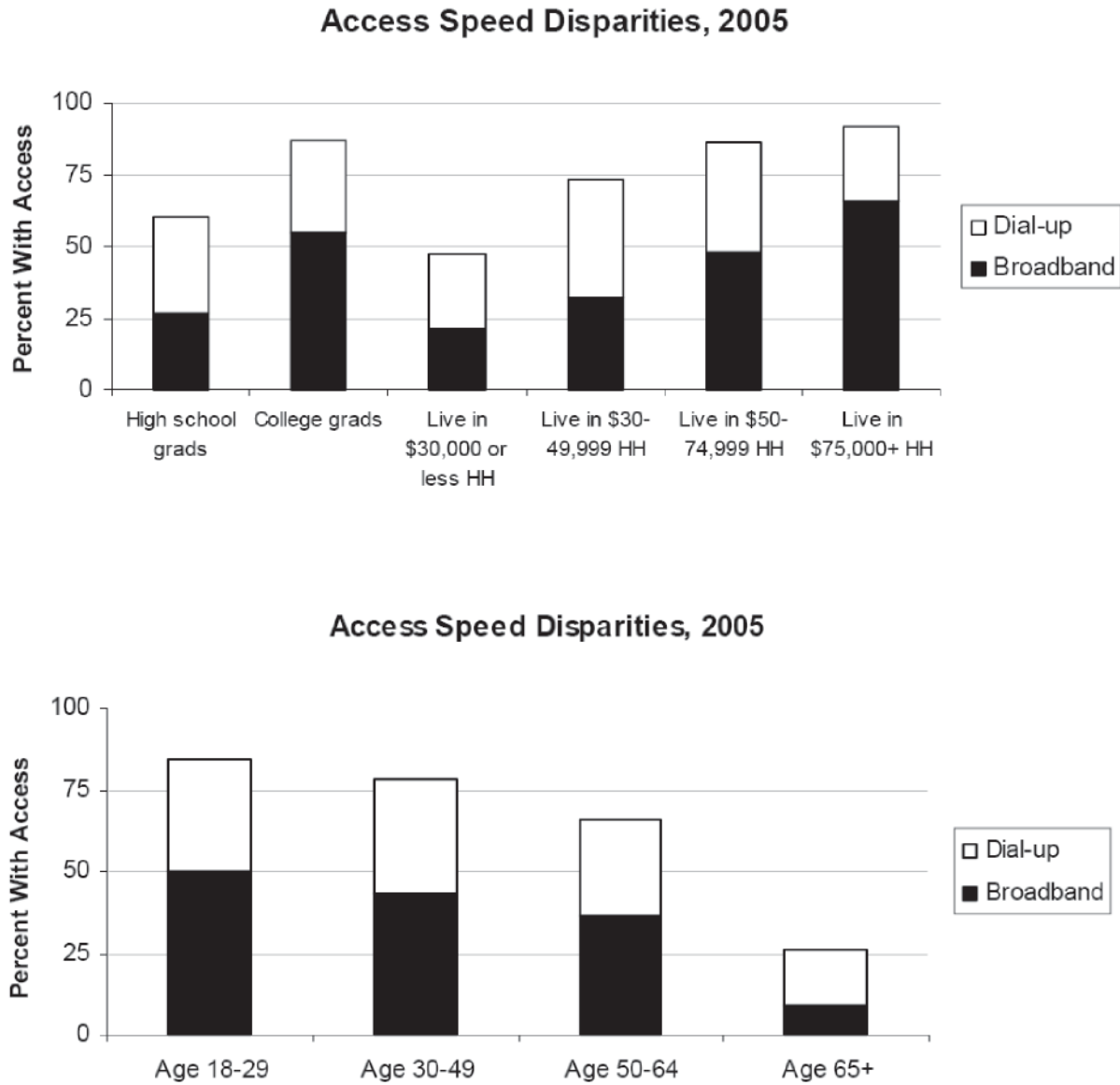
information retrieval among those accessing privately-operated health websites for health information.

CURRENT STATE OF THE DIGITAL DIVIDE?

Given that a multitude of divides impact technology access, we must reevaluate the state of the digital divide. As discussed initially, the divide is commonly thought of as distinguishing the "haves" from the "have-nots" in terms of access to information technology. This view has been questioned by critics who prefer to think of the digital divide in broader terms that lend little credence to a dichotomous portrayal (haves vs. have-nots). Rather, this revisionist perspective asserts that traditional views of the digital divide exclude fundamental societal divides, and that it is these societal divisions that truly promulgate digital divisions.[31] In essence, the digital divide may be an illusion driven by the prevalence of societal divides that uniquely impact information technology access. Divides exist among individuals in terms of health literacy, and among

Figure 2. Internet Access and Access Speed Disparities Across Various Demographic Variables

Access Speed Disparities, 2005

Access Speed Disparities, 2005

Source: Fox S. Digital Divisions. Washington, DC: Pew Internet and American Life Project; 2005.

information sources in terms of quality.[31] Another distinctive divide exists between individuals who are prepared to evaluate the quality of health information acquired over internet and those who are not. When we acknowledge these various other divides, we find that access to technological resources may contribute only minimally to disparities in technology use. Addition-

ally, a one-dimensional measure for the divide (i.e., access) circumvents important contextual considerations of usability and content availability, which should both be addressed to limit barriers to technology access and use.

Under this new wave of thinking, the digital divide also becomes a function of the digital gap that researchers and prac-

titioners have failed to bridge. Given the preponderance of pre-existing and emerging technological applications (e.g., digital electronics, advanced digital displays, wireless applications, electronic data transfer capability, biometrics, mobile technologies) available for consumption, it is important to understand the capabilities of these various technologies[30] in order to make technology

work for people in need of health information and care.

ACCESSIBILITY

While accessibility of technological resources may not be the prime reason explaining differential usage patterns related to the internet and related technologies, this issue still should be addressed by health educators. Viswanath and Kreuter[7] suggested empowering individuals to use the internet by addressing relevant policy- and system-level variables. For example, while internet service provider (ISP) prices are falling nationwide, underserved areas may not be reaping the benefits of these discounts, since inexpensive rates only affect competition for middle- and upper-class customers. Pricing considerations rarely take into account rural, inner city and poor customers who may require unique pricing options to achieve internet connectivity. These monetary issues inhibit internet use among the underserved and serve to amplify divisions among internet users and non-users.[16]

To limit the new divisions brought about by ISP access speed disparities and related considerations, the National Health Information Infrastructure (NHII) initiative (http://aspe.hhs.gov/sp/NHII) was set forth as a knowledge-based network of interoperable, technological macro-systems of clinical, public, and personal health information. These types of networks would facilitate improved health decision-making by making health information available to people when and where it is needed. Partnership networks, such as NHII, are crucial when developing technology-based health communication interventions.[8] Community-level institutions and organizations can be instrumental in enabling these types of networks. Internet public access points, such as libraries, schools, and churches, offer participants quality access to the internet at a low cost. Community access centers provide a venue for individuals to become acquainted with technology in a supportive environment that fosters skill building. Health educators should be proactive in facilitating these types of interdisciplinary

partnerships. Linking together organizations and institutions helps develop the fiscal and human resource capacity necessary to provide technological products and services to those in need. If these types of collaborations are not cultivated, then health educators may never be able to make use of technology at a level commensurate with other professions.

ENABLING E-HEALTH

Since 2001, the National Cancer Institute has supported several Digital Divide Projects[32-35] to develop and test new digital outreach strategies for disseminating health information to underserved audiences. The results of these projects have provided insight into how programs can integrate technology applications specifically for underserved communities.[10] In addition, these projects have shown the differential adoption rates of technology interventions based on key demographic and behavioral variables. From these projects, we see that all technologies may not be applied with equal effectiveness. For example, one project[35] has found that technology must be coupled with entertainment value in order to reach low-literacy audiences specifically. Accountable health education researchers must recognize the need to harness the power of technology in order to meet the varying needs of individuals.[6] By harnessing the power of technology, efforts at empowering individuals to use technology may be enhanced.

Even though technology can and will be advanced in health education, technology should not simply be used for technology's sake. Rather, the use of technology should be justified by adequate evidence. Future research should inform practitioners as to the utility of diverse technologies for a variety of public health problems.[10] This evidence base is critical for the development of practical, cost-effective e-health interventions. Differential levels of e-health literacy need to be taken into account before pushing whatever the newest, most advanced technology may provide.[36] E-health interventionists should clarify who is to be included and excluded from interventions based on technological expertise and technological

capability. Participant inclusion and exclusion criteria are critical standards to consider if we are to translate e-health research into practice. When usability (i.e., measure of the quality of a user's experience when using a technological product or system) is not considered prior to e-health intervention development, key information predicting the suitability of technology is ignored. A power analysis—which examines the ability of individuals to use the power of technology to locate health information—is paramount when developing e-health interventions.[37] In the future, a "technology usability divide" may become a more poignant partition superseding access as the underlying barrier to using technology in society.

Proper support channels are recommended to prepare end-users to operate technology during e-health interventions. A fundamental concern in health education lies in altering the power structures that inhibit individuals from engaging in activities that enable behavioral adaptations conducive to health. The functionality of health promotion lies in increasing feelings of value and mastery among groups and individuals.[38] Technology initiatives should promote skills necessary to navigate, assess, and apply knowledge gained from robust information resources such as the internet.[39] For example, we need to address the fact that few websites facilitate easy navigation, and that most are developed for those who possess at least an 8th-grade reading level.[40] Developing knowledge management systems, which identify how to engineer technology-based interventions, will become necessary as more and more technological innovations become available.[31] Health informatics program developers must maintain stalwart focus on the design and program administration activities associated with the operation of knowledge management systems, as bottlenecks within these systems can cause reluctance to technology incorporation. Additionally, program participants need to be introduced to mechanisms for evaluating e-health interventions, and trained in how to apply such evaluative criteria.[41,42] The consequences of not engineering e-health systems to fit the needs of end users can range from

user annoyance to compromising patient safety.[43] Maintaining these types of complex, e-health evaluation systems may be required of future e-health educators.

TRANSLATION TO HEALTH EDUCATION PRACTICE

It should be noted that the purpose of this article was to provide a detailed overview and commentary on the digital divide as it relates to health education across its multiple settings. Future research should take note of the evidence presented herein and heed its recommendations, especially when conducted within specific settings and populations. Although this review of the past and current research indicates that the digital divide may not exist as it is historically defined, the article does not dispel the notion that certain gaps exist in use of technology in health education. As such, future studies examining the current and potential gaps related to technology use (e.g., gaps in evaluating and effectively using information) are warranted in order for health educators to explore how to minimize these gaps.

Future research may benefit from including relevant stakeholders of e-health programs (e.g., consumers, families of consumers, third-party payers, and technology, industry, and corporate representatives) during the development of e-health interventions.[8] With support from all stakeholders involved in the health care process, technological innovations in health informatics may become more viable. A new field, consumer health informatics, focuses on analyzing consumer needs for information and studies/implements methods of making health information accessible to consumers.[44] Consumer health informatics is a young field, so there is little evidence regarding the effectiveness of its interventions at this time.[8] Nevertheless, this new profession is paving the way for health care in the information age.[18] As such, standards must be developed for designing consumer health informatics technology, including specifications, guidelines, software, and tools. These standards should reflect those proposed by the World Wide Web Consortium (www.

w3.org) and the federal government (Section 508, see www.section508.gov). Transdisciplinary collaborations between, for example, informatics and health education must capitalize on the unique competencies of professionals in both fields by forming alliances and developing guidelines that will limit the fragmentation of e-health usability for intervention participants.

CONCLUSION

The rapid evolution of technology will bypass advances in health education if practitioners do not explore how technology can best be implemented to address public health priorities.[31] Technological expertise needs to be sought out when necessary, as multidisciplinary teams are critical to the design and development of e-health interventions. As Atkinson and Gold noted, "Health behavior interventionists and researchers can continue with 'business as usual' or learn to apply the [technological] tools available."[6(p501)] In the 21st century, we must envision a future that supports technological capacity and access, and move toward ensuring that all individuals are prepared to make use of technological innovations thatt can enhance health and quality of life. Envisioning this future may preclude us from holding onto the belief that the digital divide is an ongoing disparity. Other more substantive income, education, and literacy divides may serve as the true propagators of what could now be described as a mythical digital divide. Only time will tell whether the perception of a digital divide will continue to thrive off other, more tangible, societal divisions. In the meantime, health educators would be best served to sustain efforts geared toward advancing consumer health informatics and e-health service delivery. The development of these burgeoning fields can assist in dispelling the digital divide mirage, and enable all individuals to reap the revolutionary benefits that technology can bring to health education.

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