Engaged Learners and Digital Citizens

Engaged Learners and Digital Citizens:

Critical Outcomes for Teaching and Learning

By

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To my granddaughters Hannah, Samantha, Kait, and Stella …
For whom the digital future will be an amazing adventure.

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PREFACE

> The number one benefit of information technology is that it empowers people to do what they want to do. It lets people be creative. It lets people be productive. It lets people learn things they didn't think they could learn before, and so in a sense it is all about potential.
> —Steve Ballmer, Former CEO, Microsoft

The prospect of writing a book about digital technology was a daunting task. I knew this from the outset, but I proceeded boldly into the arena. Two things occurred to me during this process: (1) although I considered myself to be reasonably knowledgeable in this area, I was astounded to find out how much I did not know and how much I was learning, and (2) with every word I chose, I had a growing sense of sadness that much of what I was writing would soon be outdated. The emergence of new discoveries and thought processes redefines this area of investigation on almost a daily basis. These considerations have led me to propose what I call the Three Universal Truths About Digital Technology:

1. Everybody knows something about digital technology.
2. Nobody knows everything there is to know about digital technology.
3. We all have more to learn.

These insights brought great comfort to me, convincing me that readers out there may pick up this book and gather some small piece of information or idea about digital technology and teaching that had previously escaped them. About the time that I finished writing my first draft and was about to begin the arduous task of editing, I attended a seminar conducted by a valued colleague on the topic of social media as a teaching tool in higher education. During his presentation, my colleague referenced several resources that were new to me. My immediate response was one of shock and horror. I began to question my own capabilities and wondered whether this book would actually have anything to contribute to the professional literature. On a more selfish level, I saw myself becoming the laughingstock of higher education ("Who does he think he is…writing a book on this topic?"). Human reactions, but embarrassing nonetheless.

I then moved on to a more rational response, realizing that my Three Universal Truths were playing themselves out before my very eyes. I realized that in spite of my learning curve over the past year, I would always have more to learn about digital technology. In fact, I then concocted the Fourth Universal Truth…we should never stop learning about digital technology.

There you have it—my confessions about learning and writing over the past year. It is still very likely that this book will be outdated rather soon. It is also likely that I will attend other seminars or read other books that contain information that is new and revolutionary to my way of thinking. Again I must remind myself that this journey of discovery and rediscovery will be the pattern of growth and change well into the future. For all of us, we can only hope to remain open and excited by new developments as they make their way into our personal and professional lives.

The premise of this book is deceptively simple. It is a belief that faculty in higher education have the opportunity and the responsibility to provide learning experiences that not only include the knowledge bases of their academic disciplines but also highlight the impact and influence of digital technology. The deceptive part of this premise is the reality that a vast number of faculty members will need to improve their digital game dramatically to make this happen at any time in the foreseeable future. To take this assumption even further, I suggest that higher education must become definitively more digital to remain relevant and vital in the future.

CHAPTER ONE

BRIDGING THE DIGITAL DIVIDES

> It is dangerously destabilizing to have half the world on the cutting edge of technology while the other half struggles on the bare edge of survival.
> —Bill Clinton, Former U.S. President

Think back, for a moment, to the year 2001. That's right, the year just after the dreaded, yet uneventful, Y2K phenomenon. This was a time before the launching of Facebook, Twitter, Skype, YouTube, Google Chrome, Firefox, and the iTunes Store. In that same year, Wikipedia was first launched, and Microsoft released Windows XP. Tablets and smartphones were only in the early stages of development, and Apple announced the debut of their new portable MP3 player, the iPod. This all seems like ancient history as we reflect on the many ways in which digital technology has dramatically changed the ways we think and act.

For readers who may live and work in a digitally rich environment and have access to the latest technology, it might be difficult to imagine a lifestyle that does not include the levels of convenience, access to information, and connectivity that technology affords us on a daily basis. In the midst of this digital world, it is very easy to complain about websites that do not load as quickly as we think they should or apps that do not contain all the functionalities that we desire at a given moment. As we slowly and unconsciously become dependent on the speed, convenience, and accessibility of digital technology, our tolerance for anything less continues to diminish at a rapid pace.

Exploring the Digital Divides

Immersed in our own digital life experiences, it is easy to lose perspective on the larger issue of global access related to the use of technology. Conversations on this topic acknowledge an ever-expanding digital divide between the haves and the have-nots. The origin of the term digital divide has been attributed to a variety of sources, including Lloyd Morrisett, one of the founders of the Sesame Workshop and the *Sesame*

Street television program (Hoffman, Novak, and Schlosser 2001). Gunkel (2003), however, reports that early references to the Digital Divide can also be found in the book *The Emperor's Virtual Clothes: The Naked Truth About Internet Culture* (Moore 1995), and the National Telecommunications and Information Agency's (1995) publication *Falling Through the Net: A Survey of the 'Have-nots' in Rural and Urban America*. Gunkel et al. (2003) described the Digital Divide in this way:

> Persistent gaps between developed and developing nations, as well as gaps domestically along socioeconomic, geographic, educational, racial, and gender lines, have broadly come to be known as the 'Digital Divide'—a term that both names these disparities and stands as a marker for the concerns about them. (92)

Carvin (2000) suggested that the Digital Divide may be the "civil rights issue of the new millennium" (56). A key to understanding the impact of the Digital Divide is to assess the level at which people around the world have access to the key portal of the digital world: the Internet. Only 39.3% of the total world's population currently has Internet access (i.e., 21.3% in Africa, 31.7% in Asia, 68.6% in Europe, 84.9% in North America). On an encouraging note, these figures represent a 676.3% increase in accessibility between 2000 and 2014. Those expanded rates of service take on more significance when we consider that Africa demonstrated a 5,219% in Internet service, the Middle East demonstrated a 3060.9% increase in Internet service, and Asia demonstrated a 1006.8% increase in Internet service during that same span of 15 years (Internet World Stats 2016).

Initiatives currently underway seek to categorize Internet access as a basic human right connected to the freedoms of speech, economic development, and assembly (LaRue 2011). It is reasonable to hope that these efforts will promote ongoing expansion and availability of Internet services in countries around the world. Less certain, however, are the political and economic outcomes of such efforts. Hargittai (2003) cogently described the manner in which Internet access has simultaneously become a political and economic tool and a weapon that can be used to enhance or deny opportunity:

> In a society where knowledge-intensive activities are an increasingly important component of the economy, the distribution of knowledge across the population is increasingly linked to stratification. The mass diffusion of the Internet across the population has led many to speculate about the potential effects of the new medium on society at large. Enthusiasts have heralded the potential benefits of the technology suggesting that it will

> reduce inequality by lowering the barriers to information allowing people of all backgrounds to improve their human capital, expand their social networks, search for and find jobs, have better access to health information and otherwise improve their opportunities and enhance their life chances. In contrast, others caution that the differential spread of the Internet across the population will lead to increasing inequalities improving the prospects of those who are already in privileged positions while denying opportunities for advancement to the underprivileged. (822)

Several statistical indices have been created by the United Nations International Telecommunications Union (ICT) as a means of tracking digital technology use around the world and the status of the Digital Divide (Kolpashnikova 2009). Two examples include the ICT Opportunity Index (ICT-OI) and the Digital Opportunity Index (DOI). Using statistical formulas, the ICT-OI and DOI provide a country-by-country index and world ranking in relation to digital opportunities.

The ICT-OI focuses on three clusters of indicators: Access (e.g., percentage of households with a computer), Use (e.g., percentage of individuals using the Internet), and Skills (e.g., adult literacy rate). Individual countries are ranked based on scores reflecting their overall performance on these indicators (International Telecommunications Union 2007). These data capture the most basic parameters of the Digital Divide and provide a means to assess progress on a country-by-country and global basis.

The DOI was originally designed by the ICT (2007) as a tool to monitor the status and changes in the Digital Divide. A derived numerical score (by country) is generated based on three clusters of criteria: Opportunity (e.g., percentage of population covered by cellular telephony, mobile cellular tariffs as a percentage of per capita income), Infrastructure (e.g., proportion of households with a computer, proportion of households with Internet access), and Utilization (e.g., proportion of individuals that use the Internet, ratios of fixed broadband, mobile broadband and total Internet users). As of 2007, the countries ranked in the top ten, with the highest levels of digital availability, were the Republic of Korea, Japan, Denmark, Iceland, Singapore, Netherlands, Taiwan, Hong Kong, Sweden, and the United Kingdom (International Telecommunications Union 2007).

There is little argument about the significance of the Digital Divide and its dramatic impact around the world. Part of the challenge, however, according to Warschauer (2003), is that the Digital Divide is generally defined in a binary fashion (i.e., haves and have-nots) without due consideration of the varied ways and levels at which people might possibly use digital technology. One of the first to dig deeper into this matter,

Hargittai (2002) proposed what she called a Second-Level Digital Divide, which reflects the manner in which individuals choose to use or have the skills to make use of technology. So even though an individual may have access to the necessary hardware, software, and the Internet, other factors may dictate the level at which they are able to accomplish what is needed or possible with digital technology (van Dijk 2012).

Following the conceptualization of the Second-Level Digital Divide as a perspective for describing engagement with technology, researchers have endeavored to create (1) typologies for the various categories of users and (2) analyses of varied demographic groupings and their varied engagements with technology. We will examine several examples of these approaches as way of understanding the varied types of impact imposed by the Second-Level Digital Divide.

Types of Digital Users

Consider the vast and varied potential digital technology users around the world. These individuals will quite obviously differ along a number of unique personal dimensions (e.g., gender, race/ethnicity, educational level, income, interest in using technology). Taking away the element of accessibility for a moment (i.e., haves vs. have-nots), how can we make sense of the ways in which this vastly diverse body of individuals approaches the use of technology in daily life?

Davis (1989) endeavored to create a systemic model to describe and systematize the level at which individuals might choose to use technology. The resulting Technology Acceptance Model (TAM) is focused on two key variables that affect the levels at which individuals engage with technology. *Perceived usefulness* is defined as "the degree to which a person believes that using a particular system would enhance his or her job [or daily activity] performance" (320). *Perceived ease-of-use* is defined as "the degree to which a person believes that using a particular system would be free of effort" (320).

So, for example, imagine that I find myself in a position to consider whether or not to learn and use the newly available SuperGizmoTech device. According to the TAM, I will give consideration to its potential worth by asking myself: (1) "Will learning to use the SuperGizmoTech device make my life easier and my work more efficient?" and (2) "How difficult will it be, and how much time will it take, for me to learn how to use the SuperGizmoTech device effectively?" All other things being equal, I will make my decision to use or not to use this device based on these criteria. In other words, I will decide whether to engage with this

particular form of technology based on a pain to gain ratio (i.e., is the pain of learning this new technology worth the potential gain that I may experience?).

On a larger scale, it is necessary to consider whether individuals and organizations have the ability to remain adaptive in relation to the ongoing and inevitable changes in technology. The maxim that "technique lags behind technology" (attributed to James Wetherbe of Texas Tech University by Twigg 2001) is one that we should all remember, as it often dramatically affects the degree of pain associated with digital innovations. Twigg (2000) provided the following examples of the manner in which this formula presents itself in everyday life and in history:

- During the American Revolutionary War, the British soldiers, dressed in bright red uniforms, clustered together in a style that had made sense doing battle with swords and shields but made them vulnerable to the Americans' new style of fighting. Feelings of superiority prevented them from seeing why they were losing the war.
- Faced with the invention of the telegraph, the first reaction of the Pony Express was to buy faster horses. When that failed, they tried to hire better riders. They did not realize that the world had changed, and they went out of business.
- The first ATM was located inside a bank and was available only during banking hours. Real innovation occurred when it was placed outside the bank, available 24 hours a day. (1)

These examples illustrate the level at which human nature often motivates us to continue engaging in certain patterns of behavior that may no longer be productive. At the same time, we might also choose to resist pursuing new and ultimately more productive courses of action. With this in mind, Btrandtzæg (2010) conducted a meta-analysis of the professional literature to explore the idea of a media-user typology. He defined *typology* as "a categorization of users into distinct user types that describes the various ways in which individuals use different media, reflecting a varying amount of activity/content preferences, frequency of use and variety of use" (941). The meta-analysis suggested 22 different user typologies reported in the professional literature, containing a wide variety of labels and criteria. Btrandtzæg concluded that user typologies are largely qualitative in nature and driven by frequency of use, variety of use, and content preference.

As a frame of reference, consider the work of Btrandtzæg, Heim, and Karahasanović (2011). The researchers used cluster analysis on survey responses from a sample of over 12,000 respondents, aged 16–74, and proposed the following set of user typologies:

- **Non-users** (42% of the sample)—people who do not use the Internet on a regular basis
- **Sporadic users** (18% of the sample)—people who occasionally use the Internet for specific searches or email access
- **Entertainment users** (10% of the sample)—people who use Internet radio and TV and who download games
- **Instrumental users** (18% of the population)—people who use the Internet for specific purposes such as banking, travel, and purchasing
- **Advanced users** (12% of the sample)—aggressive Internet users who have the skill to use the tools and resources for a variety of purposes

The Pew Internet and Life Project (Horrigan 2007) took the types of technology user to a more refined level by identifying those who are elite users, those who are middle-of-the-road users, and those who have few tech assets:

Elite tech users (31% of American adults)
- *Omnivores*—8% (i.e., voracious consumers of all types of digital technology)
- *Connectors*—7% (i.e., individuals who are cell phones and online tools to connect with people)
- *Lackluster veterans*—8% (i.e., frequent users of the Internet who are less frequent users of the Internet who are not thrilled about digital technology
- *Productivity enhancers*—8% (i.e., individuals who use technology to enhance productivity and learn new things)

Middle-of-the-road tech users (20% of American adults)
- *Mobile centrics*—10% (i.e., people totally enamored with the functionalities of their cell phones)
- *Connected but hassled*—10% (i.e., people invested in technology but hassled by the intrusive connectivity)

Few tech assets (49% of American adults)
- *Inexperienced experimenters*—8% (i.e., people who occasionally use technology and would do more given the experience)
- *Light but satisfied*—15% (i.e., people who have some technology skills but technology does not play a central role in their lives)
- *Indifferents*—11% (i.e., people who have cell phones and online access but only use them intermittently)

- *Off the network*—15% (i.e., people who don't have cell phones or online access and are content without having either)

Raphael (2009) suggested a different typology that cleverly analogizes levels of digital tool usage as an individual's zodiac sign of the twenty-first century:

- **Digital collaborators** (8% of the population)—people who are always engaged and sharing via the Internet, including their blogs and community forums
- **Ambivalent networkers** (7% of the population)—people who use the Internet as much as the digital collaborators but enjoy it less, seeing the Internet as an intrusive force in their lives
- **Media movers (7% of the population)**—people who are less connected than the previous two groups but very likely to be sharing photos and videos on a regular basis
- **Roving nodes** (9% of the population)—people who want to be engaged and connected but mostly using email and chats
- **Mobile newbies** (8% of the population)—people who are new to the mobile digital world, focusing mostly on cell phone use with an occasional text message or photo
- **Desktop veterans** (13% of the population)—people who see the Internet primarily as a source of information and see the cell phone in their pocket mainly as a tool for making calls, but would rather use a landline if possible
- **Drifting surfers** (14% of the population)—people with no real loyalty to using a cell phone or the Internet
- **Information encumbered** (10% of the population)—individuals for whom the entire realm of digital technology is a troublesome burden
- **Tech indifferent** (10% of the population)—people who are totally unimpressed by the capabilities of digital technology
- **Off the network** (14% of the population)—people with no interest or inclination to be connected with or use digital technology

These studies and analyses provide an interesting and somewhat entertaining perspective on the ways in which people engage (or disengage) with digital technology. According to van Deursen and van Dijk (1999, 2011), they share several common characteristics: (1) those who have a lack of digital experience that is attributable to fear, a limited interest, or a general dislike of technology, (2) those who do not have the

equipment/digital connections necessary to use technology, (3) those who are unable to use digital technology due to limited skills or training, and (4) those who simply have limited opportunities for access as a means to develop their skills further.

Of the elements that we will examine in this text, trying to understand and predict the manner in which a diverse global population will engage with technology is by far the most intriguing and complex. Bagozzi, Davis, and Warshaw (1992) provided an often quoted and useful framework for thinking about this complex question:

> Because new technologies…are complex and an element of uncertainty exists in the minds of decision makers with respect to the successful adoption of them, people form attitudes and intentions toward trying to learn to use the new technology prior to initiating efforts directed at using. Attitudes towards usage and intentions to use may be ill-formed or lacking in conviction or else may occur only after preliminary strivings to learn to use the technology evolve. Thus, actual usage may not be a direct or immediate consequence of such attitudes and intentions. (667)

It may be helpful to think about where you fit into these digital user typologies. The challenge for all of us is to make that assessment, to be dissatisfied with the status quo, and then to create personalized strategies that help us move along to the next higher levels of digital comfort and performance.

Varied Demographic Groupings

Along with its focus on user typologies, research has focused on a variety of demographic groupings including gender, chronological age, race/ethnicity, income, and education. We will examine these variables as they relate to the use of digital technology. Kennedy, Wellman, and Klement (2003) have captured the essence of this issue:

> Most importantly, people's social characteristics are not disposable baggage to be checked at the security counter when they go online. People come to the Internet as people and not as minds-and-fingers devoid of gender, socioeconomic status, race and the like. They have backgrounds that inform their access to the Internet and how they use the Internet. They have needs, constraints and abilities that affect what they want to do online and what they can do. (165)

It is important to note that these identified demographic variables are interactive in nature, and it is often difficult to isolate individual variables

inside a research sample. Nevertheless, we can summarize cogent research on each of these demographic groupings.

Gender

Research on gender equality in accessibility, frequency, and level of digital technology use has been significant and ongoing. The United Nations, in their report *The State of Broadband 2014* (Broadband Commission of the United Nations 2014), made the following observations about the wide-ranging benefits of ensuring that women around the world gain ongoing access to digital technology:

> Gender equality in access to broadband is essential for empowering women and girls through equal access to new technologies to acquire ICT skills and better-paid jobs, access information, and redress some of the inequalities they face in their everyday lives. If women and girls are unable to enjoy the same access to ICTs, and relevant content, they can find themselves at a serious disadvantage in becoming fully literate, learning about and exercising their rights, participating in public and policy-making processes and accessing skilled jobs. (42)

This report implicitly acknowledges the worldwide discrepancy in access afforded to women as compared with men. Further, it suggests that gender-based discrepancies are significantly more prominent in developing countries. Data indicate that 16% fewer women than men in developing countries use the Internet, as opposed to a 2% differential in developed countries.

Discussions regarding gender-based inequities and digital technology are not a new development (Cooper 2006; Cooper and Weaver 2008; Cotten, Anderson, and Tufekci 2009; Gil-Juárez, Feliu, and Vitores 2012; Kennedy, Wellman, and Klement 2003; Tarrés and Montenegro 2015). A significant aspect of these inequities is a persistent process of attribution that favors men using technology (Cooper, 2006). This process begins with *gender stereotypes* (i.e., expectations for the ways in which males and females should engage with technology), followed by *attribution patterns* (i.e., attributing success or failure to prevailing stereotypes), resulting in *computer anxiety* (i.e., emotional responses and thought patterns related to the use of technology) and ultimately a collection of personal attitudes about computer use that correspondingly have an impact on computer performance. Cooper (2006) provided the following antidote to the continuance of gender bias in relation to digital technology:

> Solving the problem of the gender Digital Divide will not be easy. In order to allow girls to benefit from the most important innovations of modern society, we must even the playing field and encourage girls and boys to partake of technology as a function of their interest, not as a function of their gender. (332)

Research has provided support for Cooper's assertions that attribution affects personal perceptions and abilities related to digital technology. Hargittai and Shafer (2006) addressed what they called the "user side of the equation" (445). They asked a sample of adults, varying in age, to assess their own perceived skills and to engage in a variety of digital tasks (e.g., finding job/career information, purchasing a used car, finding music to listen to online). The results indicate that the men had more confidence in their own skill levels than the women did. Interestingly, however, the men and women did not demonstrate significantly different skill levels on the digital tasks.

Faulkner (2001), drawing on the work of Cockburn (1992), suggested that discrepancies related to opportunity and technology are evidenced in a variety of rather subtle but significant ways. Examples include strong gender-based divisions of labor (based on the strong connection between masculinity and technical skill), cultural images of technology that are pervasively associated with masculinity, and the gender identities associated with men who play and work with technologies.

As might be expected, the degree to which gender-related elements of the Digital Divide can be observed affecting the lives of individuals often covaries with other demographic variables (e.g., chronological age, geographic location, education, income). For example, a woman living in a male-dominated culture may have fewer ongoing opportunities to learn and use digital technology tools than her counterparts in cultures where women experience greater levels of independence, encouragement, and opportunity.

It is reasonable to ask, "Are things changing in relation to digital technologies and gender?" Emerging studies indicate some positive movement in relation to perceptions and opportunities for women and technology (cf. Dresang, Gross, and Holt 2007; Li, Glass, and Records 2008; Remmele and Holthaus 2013; van Deursen and van Dijk 2011). However, much remains to be done on a global level so that women have equal opportunities to access and use digital technology.

Chronological Age

In 2001, Marc Prensky published an article proposing a division of the world's population into two distinct groups, which he called *Digital Immigrants* and *Digital Natives*. Digital natives, people born after roughly 1982, "represent the first generations to grow up with this new technology. They have spent their entire lives surrounded by and using computers, videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age" (1). Digital immigrants are "those of us who were not born into the digital world but have, at some later point in our lives, become fascinated by and adopted many or most aspects of the new technology" (1–2). Prensky was quick to point out that even though digital immigrants may learn, at some level, to adapt themselves to a growing digital culture, they tend to retain a telltale "accent" that distinguishes them from digital natives.

Prensky's initial distinction between digital natives and digital immigrants, in some ways reminiscent of the generational work of Howe and Strauss (2000), was an early attempt to make sense of the emerging interaction between digital technology and chronologically distinct groups of potential users. Since 2001, Prensky's article has been cited over 10,000 times in a variety of publications! The tenor of these citations range from a tacit acceptance of the native–immigrant dichotomy (Herther 2009; O'Brien and Scharber 2010; Stucker 2005) to systematic research-based arguments that debunk these designations and propose that they are inappropriate or unnecessary (Bennett, Maton, and Kervin 2008; Helsper and Eynon 2010; Kennedy et al. 2010).

One of the more interesting takeoffs on the digital immigrant–digital native scenario was provided by White and Le Cornu (2015), who proposed that the designations of *Digital Visitors* and *Digital Residents* are more helpful descriptors. Digital visitors are "those who understand the Web as akin to an untidy garden tool shed. They have defined a goal or task and go into the shed to select an appropriate tool to attain their goal. Task over, the tool is returned to the shed. It may not have been perfect for the task, but they are happy to make do so long as some progress is made" (5). Digital residents, on the other hand, "see the Web as a place, perhaps like a park or a building in which there are clusters of friends and colleagues whom they can approach and with who they can share information about their life and work. A proportion of their lives is actually lived out online where the distinction between online and off-line is increasingly blurred" (5–6). These distinctions provide a more useful way of looking at digital tool use as they extend beyond simplistic age-based distinctions and add references to mindsets and lifestyle choices.

Helsper and Eynon (2010) concurred that it is overly simplistic to use chronological age as a predictive variable in determining the level at which an individual might have the predilection for and corresponding skills to make effective use of digital technology. Their survey, however, demonstrated differences in the types of digital activities common to various age groups. Younger participants (i.e., ages 14–25) were significantly more likely to engage with the Internet for tasks related to entertainment, fact checking, person-to-person networking, and social networking. Older participants (i.e., older than 35) tended to use the Internet for shopping, investment, e-government, and travel-related activities. After an additional examination of their data, however, the researchers pointed out that experience is a key factor in digital tool use. Simply stated, the more an individual uses the Internet, the more likely that person is to continue to use the Internet because key digital features become integrated more easily into their ongoing daily activities.

In assessing Prensky's (2001) delineation of digital natives and digital immigrants, it is important to remember the level at which the digital landscape has exploded since their introduction (McCracken 2011). The skill set necessary to be considered digitally competent is rapidly changing, affected by new digital tools and operations available for application in a variety of venues. In recent years, researchers have made efforts to add increased precision to observations about digital tool usage. Kennedy et al. (2010) performed a cluster analysis of survey responses from a sample of more than 2,500 college students between 17 and 26 years old. They identified four categories of digital users: (1) *power users*—roughly 14% of the sample—who make frequent use of a wide range of technological tools, (2) *ordinary users*—roughly 27% of the sample—who are standard users of common Web and mobile technology but generally avoid Web 2.0 publishing and file sharing activities, (3) *irregular users*—roughly 14% of the sample—who are standard users of common Web and mobile technology and also use Web 2.0 publishing, and (4) *basic users*—roughly 45% of the sample—who regularly use standard mobile features, infrequently use new and emerging technologies, and use standard Web technologies less often than once a week. The data indicate differentiated use of Web, mobile, and emerging technologies even among individuals who would be described as digital natives.

One final observation about chronological age and digital technology is related to user patterns among older adults. This consideration has become increasingly relevant in light of the increased prevalence of aging populations around the world. According to the United Nations Department of Economic and Social Affairs (2002), by the year 2050,

21% of the world's population will be age 60 or older (as compared with 10% in the year 2000). Granted, many of the 60-year-olds in the year 2050 are likely to have some level of technological competence; older citizens are demonstrating ever-increasing levels of digital skills (Pew Research Center 2014). At the same time, however, it is reasonable to ask whether these individuals will have access to resources that can help them keep pace with emerging technology.

It would appear that when talking about chronological age in relation to technology use, personal choice (or need) is a more important variable than membership in an arbitrary age-based category (e.g., native, immigrant). Additionally, from an actuarial perspective, the number of digital natives will continue to grow while the number of digital immigrants will necessarily decline as time passes (i.e., today's natives will always be natives). This reality calls us to focus on ways that anyone, regardless of age and given the motivation and need to use digital technology, can realize that goal in a quick and efficient manner. The question is whether today's digital natives will be inclined to remain digitally current as they grow older.

Race, Ethnicity, Income, and Education

The demographic elements of race, ethnicity, income, and education have been routinely intermingled and cross-tabulated in relation to their connection with the use of digital technology (Enoch and Soker 2006; Heemskerk et al. 2005; Junco, Merson, and Salter 2010; Seckin 2010). Although this is a reasonable and accurate approach, the results are often somewhat difficult to interpret. Zickuhr and Smith (2012) examined digital tool use among individuals grouped by age, race/ethnicity, income, and educational attainment. Some of the most dramatic findings are the increases in Internet use across all groups (e.g., men/women, household income levels, white/black/Hispanic, all levels of educational attainment) between the years 2000 and 2011. Those least likely to use the Internet, however, were individuals who preferred to take the survey in Spanish rather than English, had less than a high school education, or lived in households making less than $30,000 a year. These data illustrate the reality that although Internet access and digital technology use is increasing, groups of individuals are still not able to take full advantage of those opportunities. These limitations in access seemingly have a strong connection to race/ethnicity, levels of educational attainment, and income.

This study also documented the increasing influence of mobile technology as a factor affecting the Digital Divide. With the passage of

time, increasing numbers of individuals who historically have been limited in their Internet access (e.g., young adults, minorities, those with lower levels of educational attainment and income levels) are now beginning to use mobile devices with greater regularity to gain access. Zickuhr and Smith (2012) referred to this phenomenon as a "mobile difference":

> Once someone has a wireless device, she becomes much more active in how she uses the Internet—not just with wireless connectivity, but also with wired devices. The same holds true for the impact of wireless connections and people's interest in using the Internet to connect with others. These mobile users go online not just to find information but to share what they find and even create new content much more than they did before. (14–15)

These authors also pointed to differences in the way that people use mobile devices. For example, Hispanic and black/non-Hispanic individuals are more likely than their white counterparts to use their smartphones to send or receive text messages, take pictures, send or receive email, play a game, play music, access a social networking site, watch a video, post a video, engage in online banking, and participate in a video call or chat.

James (2007) also suggested that mobile telephony presents a significant opportunity in responding to the challenges of the Digital Divide. In a companion article, James (2008) pointed out one of the key advantages of mobile technology in creating digital opportunities is that it requires limited or no literacy skills to operate (as compared with the Internet and email, which require literacy and language skills, computer literacy, and technical competence). This observation is helpful in that it points toward data-based evidence for a potential strategy for addressing the digital divides. We examine this issue in detail in Chapter Seven.

People with Disabilities

Another demographic group that deserves attention in any discussion of digital divides is people with disabilities. The World Health Organization (2016), in addressing the more than one billion people who experience a disability (27% of the world's population at widely varying degrees), uses the following definition:

> Disabilities is an umbrella term, covering impairments, activity limitations, and participation restrictions. An impairment is a problem in body function or structure; an activity limitation is a difficulty encountered by an

> individual in executing a task or action; while a participation restriction is a problem experienced by an individual in involvement in life situations.

There are three major challenges in fully understanding digital access issues in relation to people with disabilities. First, the term *disabilities* covers a tremendous array of challenges, including intellectual deficits, learning problems, sensory deficits, movement-related challenges, and social/emotional/behavioral difficulties. So although someone may have a particular type of disabling condition, that condition does not automatically have an impact on the level at which the person can engage with digital technology (i.e., the disability might affect the person's access to technology).

Second, it is often difficult to determine whether individuals with disabilities are prevented from gaining full access to technology or whether they lack the ability to use it. For example, *person with an intellectual disability* is used to describe individuals with an extremely wide range of challenges and abilities. Some people with intellectual disabilities live independently and have full-time employment. Others experience a collection of challenges (e.g., language and communication, mobility and dexterity, social and behavioral challenges) that could overwhelm their ability to engage effectively with digital technology. The label itself is not a valid predictor of technology access or use.

Third, for many individuals with disabilities, gaining access and the skills necessary to engage with technology will also entail the availability of appropriate training and adaptive equipment. Although this task is not insurmountable, the availability of these resources is often a difficult obstacle to overcome.

The United Nations Broadband Commission (2013) identified four major obstacles to increasing access to digital technologies for persons with disabilities: (1) the cost of assistive technology, including hardware and software, assessment, training, and support services; (2) a generalized lack of accessibility technologies (e.g., availability of screen readers in languages represented around the world); (3) too few policies designed to foster the widespread availability of digital technologies for people with disabilities (e.g., only 36% of countries currently have accessibility policies related to people with disabilities); and (4) the limited availability and use of digital technology for people with disabilities, which in and of itself is a limiting factor in the promotion of social, educational, and economic equalities. Clearly, disabilities provide yet another component of the Digital Divide that will require ongoing attention and action.

Higher Education and the Digital Divides

Many of the challenges that we have discussed related to digital divides can have a dramatic impact on the level at which individuals can take full advantage of higher education. The following example offers perspective on making digital advancements part of the higher education experience without also providing the necessary resources and support for faculty and students:

> …it's not surprising that working-class students, especially students of color, often do not have internet access at home. Those who do are more likely to use dial-up services or to work on older, slower computers. Colleges and universities try to address this problem by providing open labs and wireless internet access in college buildings. But even with reasonably good technology available on campus, many of our students struggle to complete online assignments, access readings and other course materials online, or do projects using new media. Why?
>
> The obvious answer is time….Most of our students live off-campus, sometimes as much as an hour away, and most work, often 40 hours a week or more. They come to campus for classes, and they have difficulty finding time to stay or to come back to access computers. Often, the time they have to do schoolwork is the middle of the night, when campus labs are closed.
>
> But even when they can find time to work on campus computers, these students come into the lab with limited experience, so doing internet-based assignments is harder. They may not be familiar with their own…But for many, catching up digitally is a slow and daunting process. (Linkon 2011)

It is important to consider the manner in which the digital divides affect curricular decision-making in higher education. For example, there will undoubtedly be students enrolled in colleges and universities who do not have ongoing access to a computer and have limited skills in using computers. This is not a reflection on their abilities, nor does it address whether it is appropriate for these students to be enrolled in a college or university. This reality, however, will have an impact on the level at which they will be able to engage effectively with resources or assignments that require digital technology.

Consider an example of this dilemma. I was teaching an online class that routinely required the electronic submission of written assignments. This was an entry-level course in an associate degree program. The members of this class were adult learners, many of whom were returning to an educational setting for the first time in years. One particular student

persisted in typing into a visual editing box rather than attaching the assignment as a document. As the instructor, I thought it would be helpful to advise this student that in this class, and in future classes, her assignments should be attached in the form of a "Word doc." Her response was, "What is a Word doc?" This anecdote is not intended to be a negative judgment of this particular student. In all other ways, she was an excellent and engaged student. Further investigation revealed, however, that she did not have ongoing access to a computer and was not versed in the skills necessary to prepare a formatted document using a word processor.

This scenario is an example of how the Second Level Digital Divide can present itself in a very awkward and untimely manner. This student, who is otherwise highly qualified and motivated, did not have the skills necessary to engage with the writing assignments in this online course. Fortunately, we were able to work out these challenges within the confines of the course. This student is but one example of many students who, otherwise qualified and motivated, may be hampered in achieving their goals because of the digital divides.

We explore the implications of the digital divides and higher education further in Chapter Three.

Talking Points

The preceding analysis of digital divides is intended to provide context for the remainder of our exploration related to the use of technology by the primary residents of higher education: faculty and students. In the remaining chapters of this text, we focus on the ways in which faculty can play a key role in ensuring that all their students have the ability to exercise the roles and responsibilities of digital citizenship. As we discuss, achieving this goal requires that faculty members continually learn new ways to use technology effectively and intentionally in their teaching.

In this chapter, we have discussed the following topics:

- The presence of a digital divide that affects individuals in varied locations around the world; they are denied access to digital technology and all that it affords
- The existence of a second level digital divide that encompasses the manner in which individuals choose to use or have the skills to make use of technology
- Demographic factors that have traditionally limited access and use of digital technology, including gender, chronological age, race/ethnicity, income, education, and the presence of a disability

Reflective Questions

1. What evidence of digital divides (i.e., access, use) do you observe among the people with whom you work on a daily basis?
2. What are the ways in which your organization assists employees in enhancing their digital skills?

CHAPTER TWO

REDEFINING THE PARAMETERS OF KNOWLEDGE

> Knowledge is of two kinds. We know a subject ourselves, or we know where we can find information upon it.
> —Samuel Johnson (1709–1784), English Poet and Essayist

Beginning with Plato's Academy, and onward to the trivium and quadrivium, John Henry Newman's *The Idea of a University* (1852), and Derek Bok's (2013) analysis of the current state of higher education, knowledge and its application have always been valued elements of the college experience (McCluskey and Winter 2012). Although couched in a variety of ways (e.g., competencies, skills, dispositions, learning outcomes, levels of understanding, Bloom's taxonomy), higher education learning structures balance themselves on the degree to which they can effectively deliver graduates who have mastered collections of knowledge in their chosen areas of study.

An Ever-Growing Body of Knowledge

The definition and acquisition of knowledge is a rapidly moving target. Buckminster Fuller (1982), in his classic text, *Critical Path*, suggested the evolutionary Knowledge Doubling Curve, whereby the quantity of available knowledge doubles in ever-shortening intervals of time. For example, he theorized that from the Year One until the Year 1900, the quantity of available knowledge in the world doubled every 100 years. By the end of World War II, the pace of knowledge creation had increased such that it was doubling every twenty-five years. Latest estimates, in the twenty-first century, suggest that the volume of available knowledge is doubling every thirteen months. This explosion of knowledge and accessibility, which started in a linear path, is now exponential. Futurist Ray Kurzweil has predicted that, in the near future, the quantities of available knowledge will double every twelve hours (Wolf 2008).

Kurzweil (2014) also suggested that this phenomenon is largely attributable to the influence of digital technology, and he predicted continued levels of growth and change well into the foreseeable future.

As a spinoff of the knowledge-doubling phenomenon, consider the speculation that identified individuals at points in history were considered to have "known everything" at the time that they were alive (Hmolpedia 2015). Some of those identified (in chronological birth order) include philosopher Aristotle (Kharbe 2009), philosopher Roger Bacon (Kidder 1992), mathematician and inventor Leonardo da Vinci (Brass 2004), philosopher and statesman Sir Francis Bacon (Swenson 1998), poet and polemicist John Milton (Jones 2001), mathematician and Jesuit scholar Athanasius Kircher (Findlen 2004), mathematician and philosopher Gottfried Leibniz (Thomas 2004), inventor Emmanuel Swedenborg (Thayer 1999), philosopher Immanuel Kant (Terras 2003), scientist Thomas Young (Robinson 2007), philosopher John Stuart Mill (Cialdini 1998), paleontologist Joseph Leidy (Warren 1998), mathematician Henri Poincare (Weisberg 2006), economist Thorsten Veblen (Heilbroner 1999), and sociologist/philosopher Max Weber (Grey 2005).

These individuals, who lived hundreds of years ago or more, are part of an elite group that could never be replicated in the twenty-first century. With the breadth and scope of knowledge as it now exists and as it will exist in the future, it is inconceivable that any individual in the twenty-first century could ever be considered to have the ability to "know everything." At the same time, however, it is ironic to note that citizens of the twenty-first century have immediate access via the Internet to more knowledge than these individuals could have collectively imagined. It is mind boggling to think about what the digital future holds for all of us.

Plentiful and Accessible

As knowledge has become more plentiful, it has also become remarkably more accessible. In the digital age, massive amounts of information are quite literally at our fingertips. This enhanced level of accessibility has taken on epic proportions. As we consider the role of technology in higher education, these emerging variables have great significance for faculty as they design courses and for students as they prepare for their lives in an ever-expanding digital environment.

In the digital context, several key mechanisms deliver knowledge:

- Published websites
- Published books