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Society, Culture, and Technology:

Ten Lessons for Educators, Developers, and Digital Scientists

Richard E. Ferdig

SOCIETY, CULTURE, AND TECHNOLOGY

Ten lessons for Educators, Developers, and Digital Scientists

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From palaces adorned with ivory
the music of the strings makes you glad.

Psalm 45:8b (NIV)

Contents

INTRODUCTION

Stapling my TPS reports

The movie *Office Space*[1] is a cult classic. It's a comedy focused on an office employee named Peter who is trying to cope with a job he hates. The movie satirized the '80s and '90s cubicle technology scene and provided decades' worth of one-liners regarding everything from printer paper jams to dressing up for work. It even contained moderately good advice for today's employees and job seekers. In a conversation with his girlfriend at the end of the film, Peter complained about his situation:

> *Peter:* I don't know why I can't just go to work and be happy like I'm supposed to, like everybody else.
>
> *Joanna:* Peter, most people don't like their jobs. But you go out there and find something that makes you happy.

There are several reasons this movie has become ingrained in my psyche and my everyday vocabulary. First, the movie does an excellent job caricaturing people's quirks, passions, and quirky passions. The boss, Bill Lumbergh, spends his workdays ensuring people accurately submit a seemingly trivial cover sheet on the company's TPS reports ("All right, Bill. Let me ask you this. How much time each week would you say you deal with these TPS reports?"). And Milton, an ostracized employee who just wants a piece of birthday cake, threatens to burn down the building if someone steals his precious stapler ("I used to be by the window, where I could see the squirrels and they were merry. But then they switched from the Swingline to the Boston stapler, but I

kept my Swingline"). The truth is that people have passions, albeit sometimes misguided, that drive who they are and what they do. Understanding these passions provides insight into people's behaviors and actions.

Unlike Peter, I do love my job. But like all the characters in the film, I also have many passions (some of them quirky). One of them that I like to think is more academically acceptable is studying the relationship between technology, society, and culture. That is actually the second reason I really enjoy this movie. It does a great job of capturing some aspects of the technology field, its associated workplaces, and its cultures and subcultures. I held two different jobs during the *Dilbert*[2] cubicle era, and I can personally attest to some of even the most outrageous parodies presented in this film. Said differently, even someone who had not been a part of that era or who had not worked in that scene could gain insight into how technology shaped the way people worked and engaged with each other during that time. Viewers could at least also guess at how those same societal and cultural contexts then led to immediate (and now long-term) technology developments.

My passion for society, culture, and technology began in my doctoral studies at Michigan State University. The program was shifting from a more instructionally design-based curriculum to a broader and more interdisciplinary focus on technology and (dare I say) learning sciences. We had the opportunity and were encouraged to read outside of our field, drawing from fields like psychology, sociology, and history to frame a broader and deeper foundation for educational technology research and practice. Our classic canon was expanded to include Bijker's work on sociotechnical change,[3] Geertz's exposition on thick description,[4] Winnicott's exploration of transitional objects,[5] and even Pelto's perceptions of how snowmobiles changed herding practices in the Arctic[6] (all of these terms and studies are explained in this book).

In the mid to late 1990s, personal digital technologies and the Internet were still relatively new. The default for me was to see technology innovations as doing something that had never been done before. However, this new compendium of literature opened my eyes to the facts that (a) there was an important relationship between society, technology, and culture; and (b) regardless of my naïveté, this relationship had existed long before we were attempting to teach people how to connect their 300-baud modem to the early web browser Mosaic.[7]

I quickly became an evangelist for teaching these two facts to anyone who would listen (and even to those who wouldn't). I created a doctoral seminar called "Society, Technology, and Culture" during my tenure at the University of Florida. My students and I spent countless nights in discussions that lasted well beyond traditional class hours debating issues like whether Microsoft's forced personalization of desktop experiences was beneficial or a threat to our privacy and our decision-making. I enjoyed the conversations so much that I didn't even mind being mocked by students for my undying passion for deliberating the impact of stone and steel axes on the Yir Yoront tribe[8] in Australia. This passion continued in my cocreation of a similar class intended for undergraduates in Kent State University's recently created Digital Sciences program.[9]

I would like to think the classes and the conversations were a success. But much like Milton or Lumbergh from *Office Space*, I was so attached to the topic that it probably took me longer than it should have to learn two important truths:

1. <u>It is easy to overwhelm those learning about the relationship between society, culture, and technology.</u> There is a tremendous amount of content when you consider research studies, theoretical lenses, key authors, and subcomponents of the relationship (e.g., identity, relationships, race, etc.).

2. It is not always easy to help learners both understand the relationship between society, culture, and technology *and* appreciate the importance or implications of the relationship. Sometimes content is learned without fully comprehending the importance of it; at other times, learners may see why it's important to the broader field but not to their current and future careers.

This book was developed in response to these two truths; it is my attempt to come full circle (to staple my TPS reports, if you will) by not only helping people see the connections between society, culture, and technology, but also helping them set the stage for applying the critical (and hopefully beneficial) implications. I have synthesized the existing, interdisciplinary literature and boiled it down to 10 important lessons. Using research studies as well as current and historical examples, I hope to help readers quickly appreciate the existing relationship between society, culture, and technology (or digital sciences). I use that same literature to provide evidence that this relationship has existed long before digital innovations. In doing so, readers will begin to see the important components that deserve further attention (e.g., the impact on identity, how relationships change, etc.).

The book was also written to help readers begin to make connections between what they are reading and what they are now supposed to do next. To do so, each chapter is broken down into three distinct categories in what I call the What?, the So What?, and the Now What? The What? is an understanding of the content being presented. The So What? is a process of scaffolding learners to see the importance of the content being presented. The final and necessary step is helping learners think more deeply about *what* they are supposed to do *now* with the knowledge they just gained. It is easy to focus on only one of these at any point in time based on the richness of the content and the relevance to an instructor or a learner's context.

However, the intent here is to separate and then explore all three as important aspects of learning.

There are three caveats that must be conceded and explicitly stated prior to jumping into the lessons.

Ten is not a magic number. To suggest that you could learn everything you needed to know about digital innovations in 10 lessons is foolhardy. The number might be 10 or it might be 10 million. I have picked 10 because these tie to syntheses of literature and topics that have historical significance and yet also continue to emerge in the field. No matter how many new pieces of research I read, they seem to relate to these 10 concepts. Even if the number is greater than 10, this list provides a great place for educators, developers, and digital scientists to begin to understand how the relationship between society, culture, and technology impacts their current and future work.

"Ain't nothing like the real thing, baby."[10] This book is a collection of lessons based on a synthesis of research. There is no substitute for going back and reading the original works in their entirety. It probably goes without saying, but inside of these lessons are hundreds (if not thousands) of minilessons that should be explored. Going back to the original texts and/or reading future and emerging research in these areas is critical to gaining a full understanding of the issues and the important implications within each set of statements.

You can lead a horse to water, but you can't make it drink. I am happy to admit that it is a professor's or teacher's or author's job to help learners and readers with the "now what?" I have even included the process of separating the what, so what, and now what to act as an important lesson for readers. However, at some point the learner and reader must take the lessons and apply them to their own situation. Again, that seems to go without saying, but I have taught enough learners to justify the warning.

The onus is on the reader to make the final step of applying these statements to specific application within fourth-grade teaching, database programming, web security, and so forth. I have seen enough students and have engaged with enough business and university employees to know these applications are possible. Conversely, it wouldn't be possible to include all these applications in this book. Caveat lector!

Notes

1. Rappaport, D., & Rotenberg, M. (Producers), & Judge, M. (Director). (1999). *Office space* [Motion picture]. United States: 20th Century Fox.
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LESSON 1

You Spin Me Around

You spin me right round, baby
Right round like a record, baby
Right round round round

—Dead or Alive[1]

WHAT?

Patterns are all around us; and patterns, by their very nature, repeat. For instance, consider the water cycle[2] taught in elementary school. The sun causes collected water (e.g., rivers and lakes) to evaporate and rise. Condensation occurs, followed by precipitation (e.g., rain or snow) and eventual water collection. Wash, rinse, and repeat (as the saying goes). Sometimes patterns are helpful or positive, as they are in the water cycle. In other situations, patterns continue to be negative, particularly if left uninterrupted. A fear of the dentist often causes patients to miss checkups, cleanings, and general maintenance; that, in turn, means that dental visits are prolonged, potentially painful, and often acute. Not surprisingly, the outcome is an even greater fear of the dentist.[3] Good or bad, these relationships are recursive—like a record, they spin around and around.

Learners interested in a deeper understanding of the development, implementation, and impact of technologies and digital innovations—at some critical point in their

journey—begin to appreciate the recursive relationships that exist in the field. One of the more important and historically prevalent examples is the relationship between society, culture, and technology. Entire books have been written about these terms; brief definitions won't do justice to their complexity. However, a simple introduction will at least serve to set the stage for exploring the relationship.

- Richard Ely's[4] 1899 edited volume defined *society* as "the individuals, collectively considered, who mingle and converse, or who are united or organized for any purpose of common concern. Furthermore, from these concrete ideas we drive the abstract notion of society as the union itself, the organization, the sum of formal relations, in which associating individuals are bound together".[5] One of the more interesting metaphors[6] for this discussion presents society as a web of relationships.[7]
- Edward B. Tylor[8] suggests that *culture*, "taken in its wide ethnographic sense, is that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society". [9] Ralph Linton[10] further differentiated *generic culture* ("the total social heredity of mankind,"[11]) from the behaviors and characteristics of a particular group's culture.
- I personally enjoy Alan Kay's rationale when he defined *technology* as being anything invented after you were born.[12] However, this can lead (particularly younger) learners to miss the historical and nondigital aspects of the term. As such, it is appropriate to also refer to technology as methods, tools, devices, procedures, components, and strategies available to a society or culture.[13]

At the most rudimentary level, the idea is that societies and cultures have needs, problems, and opportunities that result in the development and implementation of technologies. Those technologies (and digital innovations), in turn, lead to new needs,

problems, and opportunities in societies and cultures. It does not have to start with the needs, problems, or opportunities. Sometimes technologies are developed and used in unintentional ways. Regardless of the origination, the process follows the time-honored tradition of wash, rinse, and repeat; the record goes around.

The oversimplified relationship presented here that exists between these terms (much like the definitions themselves) is justifiably complex. The basic description presented here is analogous to attempting to replicate Da Vinci's *Mona Lisa*[14] in five minutes using two colors. It glosses over the fact that technologies and digital innovations impact cultures and societies in similar and unique ways. And it fails to recognize the important obvious or hidden and nuanced differences between how cultures[15] (and/or subcultures) impact the development and uptake[16] of various technologies.

Notwithstanding such limitations in the brevity of the presentation, a recursive relationship does exist. David Kaplan[17] summarized it this way: "Technologies are fashioned to reflect and extend human interests, activities, and social arrangements, which are, in turn, conditioned, structured, and transformed by technological systems".[18] The lesson for those interested in the relationship between society, culture, and technology is that there is value in paying attention to the recursive or cyclical nature of the relationship.

SO WHAT?

I enjoy reading and hearing people's predictions for the future. My favorites are the people who pick the exact date and time of the end of the world.[19] I always tune in the following morning to hear their explanation of why their prediction was, shall we say, miscalculated. People have also made some pretty infamous predictions about technology implementations. Robert

Szczerba[20] compiled a humorous collection of such *whoops* statements, including comments about the Internet, social media, and mobile devices. For example:

> 1966: "Remote shopping, while entirely feasible, will flop." — Time Magazine.
>
> 1981: "Cellular phones will absolutely not replace local wire systems." — Marty Cooper, inventor.
>
> 1995: "I predict the Internet will soon go spectacularly supernova and in 1996 catastrophically collapse." — Robert Metcalfe, founder of 3Com.
>
> 2005: "There's just not that many videos I want to watch." — Steve Chen, CTO and co-founder of YouTube expressing concerns about his company's long term viability.
>
> 2006: "Everyone's always asking me when Apple will come out with a cell phone. My answer is, 'Probably never.'"— David Pogue, The New York Times.
>
> 2007: "There's no chance that the iPhone is going to get any significant market share." — Steve Ballmer, Microsoft CEO.

Given the potential flops associated with predictions—including those related to digital technologies—it may seem counterintuitive to suggest that the first reason this lesson is important is because of its predictive and/or decision-making potential. However, a significant component of a technologist's career is devoted and dedicated to making and testing hypotheses and predictions. *What feature should we build next? What technology should we implement in this learning environment? How will this new innovation be received?* An appreciation for the recursive relationship between society, culture, and technology can help at least provide more informed answers to these questions. This is particularly true in deference to simply attempting to blindly create, develop, implement, or repair.

Some examples help illustrate this point, starting with smartphones. Mobile devices have arguably revolutionized how we communicate, socialize, and get access to information.[21] They have also changed how we navigate.[22] Using smartphones in cars for navigation raises as many questions as it does answers about everything from safety and accuracy to interference and accessories. Imagine, now, working for a company that builds global positioning systems (GPS) that are mainly used for automobile navigation. *What is your next move to avoid being put out of business by the smartphone—a device that many people already own?*[23] *Why would consumers buy something new when something they already own does the same thing?* I am sure the owners of such corporations have long since been down this rabbit hole. The point is that examining needs, traits, characteristics, problems, and opportunities of societies and cultures (users of such devices) might provide answers to this commercial question.

There are also noncommercial applications. Project Loon,[24] for example, attempts to use balloons to provide Internet access for people throughout the world. The project is specifically focused on rural and remote areas. It is a fascinating, worthwhile endeavor. If you get beyond the hardware aspects, you reach a very interesting question. *What content, exactly, are you going to provide to the end users?* You could answer that question by focusing on more hardware (e.g., cheap devices to connect to the Internet, community computer labs, etc.); you could also push beyond to consider software applications. But are you suddenly going to connect someone in rural Rwanda to the Internet and give them access to retail shopping or stock exchanges? No disrespect is meant in this line of questioning, as there is tremendous value in providing Internet access to everyone. But simply providing access is not enough.[25]

In the former example, societal and cultural needs (e.g., navigation, access, etc.) led to the development of competing technologies (smartphones vs. stand-alone GPS devices).

Understanding next steps for both technologies requires an examination of the transformed systems. The latter example demonstrated an instance where a new technology was being provided (e.g., Internet access), and the resulting questions about uptake and implementation can't really be answered without additional information related to the societies and cultures that will be impacted. Deeper knowledge of the recursive process could be instrumental in predicting and making decisions in both instances.

A second reason this lesson is important is because it helps developers, educators, and digital scientists begin to recognize other recursive patterns. These other recursive relationships could exist within their immediate job or within the broader field (and, I would argue, in their personal lives). For instance, psychologists and educators are interested in learning; they engage with the conceptual and theoretical models of how knowledge gets in the brain. They also ask about the relationship between the individual and the society in this process.

Rom Harré[26] addressed this issue through the creation of what he called the Vygotsky Space (drawing on the work of the Russian psychologist Lev Vygotsky[27]). Knowledge moves from the social to the individual through a process called appropriation. It is then transformed by the individual and later published back out to the public. The public or social realm then conventionalizes the knowledge by correcting through feedback or potentially by adapting shared knowledge based on the individual contribution.

For instance, a student hears 2 + 2 = 4. However, they transform that to mean 2 + 2 = 5. They publish or report that fact back to the teacher, who corrects their knowledge. Or, a person hears that women cannot legally vote because they should not be allowed to vote. They appropriate that knowledge, but transform

it and publish the idea that women should have the right to vote. Society then has the opportunity to respond.

This deserves further exploration, but the point is that the process is recursive over time[28] (e.g., women's suffrage was not instantaneous[29]). It is also worth noting that in these recursive patterns, it is not necessary to play the chicken-and-egg game (i.e., what came first?). These recursive patterns can arguably start anywhere depending on when one joins the conversation. Knowledge generation between public and private (and social and individual) is another important pattern that educators, developers, and digital scientists should (a) recognize and (b) be able to utilize for future development and implementation.

NOW WHAT?

The lesson in this chapter is that the relationship between society, culture, and technology is recursive. It is an important lesson because it has predictive potential and could benefit decision-making. It is also a great example of the types of patterns digital scientists will see in the field. These reasons are implications in and of themselves; developers, educators, and digital scientists should use the relationships to make predictions, and they should be on the lookout for patterns. There are two additional implications for learners.

First, personalization and customization are important. Researchers suggest that personalization is often a system-initiated process where customization is a user-initiated process.[30] These same authors have suggested that privacy in these studies "turns out to be a key predictor of user attitudes toward personalization and customization, with clear implications for site and system design."[31]

The point, however, is that if a recursive relationship exists, then it would be futile to attempt to build or develop in a vacuum. Development and implementation require that substantial effort

be made toward personalizing and customizing for the audience's needs. One could also argue that development should be made iteratively with the audience.[32] Society and culture should not be ignored in the process.

Instructional designers refer to this process as the analysis stage in what is known as the ADDIE model.[33] Although there are multiple variations in the model,[34] ADDIE refers to analyze, design, develop, implement, and evaluate. During analysis, designers conduct needs assessments to help formulate design, development, and implementation plans and goals. Readers won't be surprised to learn that this, too, is a recursive process. Instructional design experts note the following:[35]

> ADDIE activities typically are not completed in a linear, step-by-step manner even though, for convenience, they may be presented that way by various authors. For example, during the life of a project, as data are collected and the development team gains insights, it is often necessary to move back and forth among the activities of analysis, design, and formative evaluation and revision. Thus, the iterative and self-correcting nature of the instructional design process emerges as one of its greatest strengths.

A second implication in understanding the recursive relationship between society, culture, and technology is for developers to recognize the personal nature of the recursive process. Consider the famous author Douglas Adams's take on technology:[36]

> 1) Everything that's already in the world when you're born is just normal;
>
> 2) anything that gets invented between then and before you turn thirty is incredibly exciting and creative and with any luck you can make a career out of it;
>
> 3) anything that gets invented after you're thirty is against the natural order of things and the beginning of the end of civilisation as we know it until it's been around for about ten years when it gradually turns out to be alright really.

While there is humor in his writing, there is also significant truth. Children who grew up knowing how to set the VCR clock have turned into parents who do not understand how to use virtual reality. Music listeners who swore they would never *not be hip* now apply the label of *garbage* to every current genre. And those who grew up being the first on their block to have an email address are stuck at a distance trying to evaluate the risks of words they don't understand (e.g., *memes* and *darknet*).

One could successfully argue that this pattern is somewhat mitigated for those serving in an information technology career. Maybe it is simply delayed. However, it is critical for educators, developers, and digital scientists to remember that the turning of the wheels in the cycle is not dependent solely on our individual power or perspectives. The recursive processes happen over and over independent of our staying in touch with changes in society, culture, or technology. As such, learners should consistently find ways to stay updated and engaged with their societal and cultural audiences, even if it means listening to "garbage" music.

Notes

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LESSON 2

That's Been Done Before

It's all been done
It's all been done
It's all been done before

—Barenaked Ladies[1]

WHAT?

The Barenaked Ladies (BNL) had fans in the late '90s repeating the simple phrase "It's all been done" (with any good fan also adding, "Woo, hoo, hoo"). To buy into Steven Page's lyrics, of course, you would then have to accept the fact that BNL wasn't the first to acknowledge such a truth. Some, for instance, point to George Santayana with this quote from the early 1900s: "Those who cannot remember the past are condemned to repeat it."[2] Others go back further to the wisdom of Solomon found in the Old Testament book of Ecclesiastes:[3]

> "Meaningless! Meaningless!" says the Teacher. "Utterly meaningless! Everything is meaningless." What do people gain from all their labors at which they toil under the sun? Generations come and generations go, but the earth remains forever. The sun rises and the sun sets, and hurries back to where it rises. The wind blows to the south and turns to the north; round and round it goes, ever returning on its course. All streams flow into the sea, yet the sea is never full. To the place the streams come from, there they return again. All things are wearisome, more than one can say. The eye never has enough of seeing, nor the ear its fill of hearing. *What has been will be again, what has been done will be done again; there is nothing*

> *new under the sun. Is there anything of which one can say, "Look! This is something new"? It was here already, long ago; it was here before our time* [emphasis added]. No one remembers the former generations, and even those yet to come will not be remembered by those who follow them.

The point being made by all the writers is that things don't seem to change—history repeats itself. Maybe it is because we do not know we are repeating ourselves. Or, to be more philosophical, maybe there are questions that each generation needs to continue to ask themselves (à la Simone de Beauvoir[4]). The lesson for those interested in the relationship between society, culture, and technology is that you should occasionally look backward in order to move forward.

SO WHAT?

On the surface, the statement that nothing is new under the sun seems to apply to everything *but* digital technologies. Certainly, past generations never had Facebook, Twitter, or virtual reality headsets (perhaps to their benefit in terms of social media). How do we then make sense of the seeming paradox between history repeating itself and innovations in technologies that seem new? Heraclitus of Ephesus (as quoted by Plato) suggested that "you could not step twice into the same river."[5] His argument was that it was the same river and the same person, but at the same time both consistently changed. Stepping twice into the same river would be similar but with nuanced changes to both the river and the person.

Heraclitus's words seem to be the balance between understanding how the past repeats itself and yet how we are engaging with new technologies that are indeed novel. Past generations may not have had today's technologies, but they did have both the desire and the tools to communicate (e.g., radio or telephone) and to see things differently (e.g., microscope or telescope). The goals and the desires stay the same (e.g.,

communication or closer examination), but the technologies change our ability to complete or accomplish the desire. The question remains: Why does this matter? Here, two examples help clarify the importance of looking backward to look forward technologically.

The first example comes from the Yir Yoront tribe in Australia mentioned in the introduction. (A full read of Lauriston Sharp's 1952 essay[6] on steel and stone axes is recommended.) The Yir Yoront tribe's polished stone axes were arguably the most important aspect to their economy. Sharp noted that the axes were made only by the adult men in the tribe, although other men, women, and children could use the axes if given permission and if the axes were loaned to them. The axes were used for producing other goods like wood for fires, tools, weapons, huts, and hunting. More importantly, the axes helped define and maintain much about the tribe including personal relationships, religious activities, masculinity, and even the hierarchy of the tribe. Sharp went so far as to suggest the axes played a critical role in helping enforce the dominance of male rule.

Enter the missionaries (and others) into the Yir Yoront tribe who believed that modern-day steel axes would positively change daily use and long-term outcomes for the Yir Yoront. Not only were the steel versions more plentiful, but they were also better instruments for their intended uses. Sharp made an important observation:[7]

> The white man believed that a shift from steel to stone axe on his part would be a definite regression. He was convinced that his axe was much more efficient, that it would save time, and that it therefore represented technical 'progress' towards goals which he had set up for the native.

The outcomes were not as intended. Implementation of the steel axes led to more time for sleeping and laziness rather than to accomplishing more tasks. It negatively impacted trading and

relationships between trading partners in and outside of the tribe. And the proliferation of steel axes caused social and psychological stress. Sharp concluded the following:[8]

> The most disturbing effects of the steel axe, operating in conjunction with other elements also being introduced from the white man's several sub-cultures, developed in the realm of traditional ideas, sentiments, and values. These were undermined at a rapidly mounting rate, with no new conceptions being defined to replace them. The result was the erection of a mental and moral void which foreshadowed the collapse and destruction of all Yir Yoront culture, if not, indeed, the extinction of the biological group itself.

A second example addresses the use of snowmobiles for reindeer herding in Arctic regions. Ludger Müller-Wille and Pertti J. Pelto have written extensively about changes to reindeer herding that have taken place due to the introduction of snowmobiles for various phases of herding. In a 1971 article,[9] they specifically examined adoption of the technology into northern Finland. They concluded that the use of snowmobiles was highly successful in comparison to the use of dogs and/or reindeer sleds (and arguably were most beneficial in combination with men and herding dogs). And, like other innovations, implementation changed both communication and work efficiency.

What is most interesting in the authors' account is the specific investigation into the reasons supporting or delaying adoption of the snowmobiles. For instance, they noted that the "differences in ecological setting were important in affecting patterns of adoption of the snowmobile in these areas".[10] The speed of adoption was also related to the users' type of employment (e.g., administration and construction vs. fishing and trapping). Individual adoption of new technologies was tied to personal interactions and sharing of experiences. And only wealthy herders could typically afford the new technologies, which forced others "either to acquire a machine (a severe financial

burden) or to drop out of herding".[11] The authors make this observation:[12]

> In both Lapp and Eskimo groups there may be an increasing gulf between the "haves" and the "have nots"—especially concerned with ownership of the economically important snow vehicles. This development is probably reinforced by the complicated processes of accumulating capital needed for the deployment of modern technology, and the new social and economic stratification arising from the redistribution of capital.

So, what do reindeer and steel/stone axes have to do with an understanding of modern technologies? The main lesson in this chapter is that history repeats itself. Compare the modern-day example of Facebook with the historical implementation of steel axes. The introduction of steel axes had immense psychological, social, and cultural implications for the Yir Yoront tribe. Recent published research on Facebook use has shown similar stresses and outcomes related to body image dissatisfaction / higher eating disorder risk,[13] jealousy,[14] deterioration of mood,[15] social dysfunction,[16] and negative emotional changes.[17] Now compare findings from the use of snowmobiles with modern-day mobile phone adoption. Adoption levels of mobile phones have been shown to be related to market conditions and gross domestic product.[18] Age, gender, and career can have an impact on mobile phone use and type of network contract acquired.[19] Peer influence and financial burden impact early adoption of smartphones.[20] And smartphone adoption may be expanding the divide between the haves and have-nots.[21]

Before I get burned at the stake for suggesting that all Facebook and mobile device use is negative, I freely acknowledge that there can be positive outcomes in the adoption and use of both. Facebook use can, in certain circumstances, increase self-esteem.[22] Mobile phone apps can teach park visitors about science and nature.[23] The use of both can lead to positive *and* negative outcomes (e.g., growth or reduction of the digital

divide[24]). Rather, the point I am trying to make is that you could replace steel axes with Facebook or snowmobiles with smartphones in the aforementioned text and many of the outcomes and descriptions would be similar.

The Yir Yoront tribe did not have access to Facebook, but the tools they were using led to psychological, communication, and mental health changes—just like Facebook users decades later. The early Lapp implementation of snowmobiles had nothing to do with smartphones and yet early adoption and use was impacted by social status, finances, and career choice—similar to the uptake and adoption of today's mobile devices. The lesson for this chapter is that there are historical examples of "technological implementations" that can be examined to help understand adoption and resulting outcomes of modern-day innovations. The "so what?" is that studying these examples could lead to better development, implementation, and adoption of new tools for educational and commercial purposes by learning from the successes and failures of past innovations. This is obviously related to the prior chapter's claim that the relationship between society, culture, and technology is recursive. The point here, however, is that the recursive nature is historical beyond just our three-to-five-year window of modern technology implementations.

NOW WHAT?

There are three next steps for applying this lesson. First, I encourage anyone interested in a historical and cultural view of technology to watch the film *The Gods Must Be Crazy.*[25] In the movie, Xixo (a San) and his tribe are introduced to Western culture from a Coke bottle being dropped out of an airplane. Given the problems that emerge from its use, he agrees to throw it off the edge of the world. In a parallel story line, a city and its modern-day advantages and problems are portrayed. The worlds collide, and the story focuses on what happens next.

This is not the only movie to explore the relationship between technology, society, and culture (e.g., *The Matrix*[26] or *2001: A Space Odyssey*[27]). To that point, I always encourage those interested in digital technologies to begin looking at all media (including movies) as examples and explorations of the relationship between society, technology, and culture. However, *The Gods Must Be Crazy* does an excellent job of juxtaposing modern-day and historical technologies as well as traditional versus "advanced" cultures. Watching the film is great practice in attempting to rethink what we consider technology, how technologies impact society and culture, and how we look historically to understand the potential impact of new innovations.

Second, if reading the past can point to a better future, then the most obvious implication is to become a better student of history. This is easier said than done. People are busy; more importantly (and to reference a philosopher's dilemma), digital scientists often don't know what they don't know. They may be unaware of readings or research results from other fields and disciplines that could inform their understanding. To address this, technology advocates should find new ways to create networks of positive influence in and outside of their field. This is addressed in more detail in chapter 7 (getting connected) and chapter 10 (working in an interdisciplinary manner).

Readers should also examine the footnotes throughout this entire book as potential sources for continued explorations. As shared in the introduction, going back to the original readings (and scouring their reference sections) will provide a lengthy yet worthy reading list. Specific titles might include the following:

- Askew, K., & Wilk, R. R. (Eds.). (2002). *The anthropology of media: A reader*. Oxford: Blackwell.
- Basalla, G. (1988). *The evolution of technology*. Cambridge, UK: Cambridge University Press.

- Bijker, W. E., Hughes, T. P., Pinch, T., & Douglas, D. G. (2012). *The social construction of technological systems: New directions in the sociology and history of technology*. Cambridge, MA: MIT press.
- Cole, M. (1998). *Cultural psychology: A once and future discipline*. Cambridge, MA: Harvard University Press.
- Gaarder, J. (2010). *Sophie's world*. London: Hachette UK.
- Spicer, E. (Ed.) (1952). *Human problems in technological change*. New York: Russell Sage Foundation.
- Wright, B. D. (Ed.). (1987). *Women, work, and technology: Transformations*. Ann Arbor: University of Michigan Press.

A third implication is for digital advocates to acknowledge the potential historical referents of digital innovations. Simply being aware that an innovation—or the idea behind an innovation—may not be new is an important mind shift. Take, for instance, Internet memes. Limor Shifman[28] defines Internet memes as "ideas, symbols or practices formed in diverse incarnations, such as melodies, catch-phrases, clothing fashion or architectural styles".[29] Internet memes[30] often take the form of pictures with catchphrases, such as the Grumpy Cat,[31] Condescending Wonka,[32] and the Success Kid.[33] They are popular in both use and research on their use. For instance, they have been examined for their impact on collective identity,[34] racial microaggressions,[35] religious meaning-making,[36] cultural capital,[37] meme virality,[38] and self-harm.[39]

It would be easy to assume that Internet memes are relatively novel—a creation of the last 5 to 10 years. It often surprises users of memes that the concept has been around long before widespread personal access to the Internet. Most authors point to and give credit to Richard Dawkins for coining the term in 1976.[40] Shifman, crediting Dawkins, defined them in this way:[41]

> Small cultural units of transmission, analogous to genes, which are spread by copying or imitation. Like genes, memes undergo variation, selection and retention. At any given moment, many memes are competing for the attention of hosts. However, only memes suited to their socio-cultural environment will spread successfully; the others will become extinct.

The implication here is that there needs to be a willingness to examine new technologies as being a replication or a nuanced change in something that has been done before. Using this approach, one could even go so far as to suggest that Internet memes as cultural transmission are very similar in nature to graffiti or street art.[42] There are obvious differences given the speed of dissemination and widespread access. However, explorations of similar, historical topics might lend insight into why memes are adopted or dropped and how they represent societal and cultural ethos.[43] The broader argument and implication are that having a historical mind-set will prepare a reader and learner for a deeper and broader understanding of the topic.

Notes

1. Page, S. (1998). It's all been done. [Recorded by Barenaked Ladies]. On *Stunt* [CD]. US: Reprise Records.
2. Santayana, G. (1905). *The life of reason: Reason in common sense*, p. 284. New York: Charles Scribner's Sons.
3. Ecclesiastes 1:2–11, NIV
4. See http://www.iep.utm.edu/beauvoir/
5. Sedley, D. (2003). *Plato's Cratylus*. Cambridge, UK: Cambridge University Press.
6. Sharp, L. (1952). Steel axes for stone-age Australians. *Human Organization, 11*(2), 17–22.
7. Sharp (1952), p. 20.
8. Sharp (1952), p. 21.
9. Müller-Wille, L., & Pelto, P. J. (1971). Technological change and its impact in Arctic regions: Lapps introduce snowmobiles into reindeer herding. *Polarforschung, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research & German Society of Polar Research, 41*(1/2), 142–148.
10. Müller-Wille & Pelto (1971), p. 142.

11.Müller-Wille & Pelto (1971), p. 144.

12.Müller-Wille & Pelto (1971), p. 147.

13.Cohen, R., & Blaszczynski, A. (2015). Comparative effects of Facebook and conventional media on body image dissatisfaction. *Journal of Eating Disorders, 3*(1), 23.

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20.Lee, S. Y. (2014). Examining the factors that influence early adopters' smartphone adoption: The case of college students. *Telematics and Informatics*, *31*(2), 308–318.

21.Tsetsi, E., & Rains, S. A. (2017). Smartphone Internet access and use: Extending the digital divide and usage gap. *Mobile Media & Communication*, *5*(3), 239–255.

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24.See Rhoades, H., Wenzel, S. L., Rice, E., Winetrobe, H., & Henwood, B. (2017). No digital divide? Technology use among homeless adults. *Journal of Social Distress and the Homeless*, *26*(1), 73–77. Also see Feng, Y., & Xie, W. (2015). Digital divide 2.0: The role of social networking sites in seeking health information online from a longitudinal perspective. *Journal of Health Communication*, *20*(1), 60–68.

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26.Silver, J. (Producer), & the Wachowski Brothers (Directors). (2000). *The Matrix* [Motion picture]. United States: Warner Bros.

27.Kubrick, S. (Producer & director). (1968). *2001: A Space Odyssey* [Motion picture]. United States: Metro-Goldwyn-Mayer.

28.Shifman, L. (2012). An anatomy of a YouTube meme. *New Media & Society, 14*(2), 187–203.

29.Shifman (2012), p. 188-189.

30.See http://knowyourmeme.com/

31.Marwick, A. (2013). Memes. *Contexts, 12*(4), 12–13.

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42.See Drew, P. (2012). A meme is born: The repetitive patterns of street art. *Artlink*, *32*(1), 40–42. Also see McGookin, D. K., Brewster, S. A., & Christov, G. (2014, April). Studying digital graffiti as a location-based social network. In *Proceedings of the 32nd Annual ACM Conference on Human Factors in Computing Systems* (pp. 3269–3278). ACM.

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LESSON 3

Everyone Is Looking for Answers

I guess hard times flush the chumps. Everybody's lookin' for answers . . . [I'm] bona fide. I've got the answers!

—Ulysses Everett McGill in the film *O Brother, Where Art Thou?*[1]

WHAT?

The Coen brothers used the film *O Brother, Where Art Thou?* to reinforce a truth about people, societies, and cultures: We are all looking for answers. The film's main character, Ulysses Everett McGill, is described as "a know-it-all that can't keep his trap shut!" He uses various interactions in the film to testify to having all the answers; ironically, in the end, situations force him to finally acknowledge that maybe he doesn't have all the answers.

I quote Everett's line "Everybody's lookin' for answers" every time I'm engaged in two types of technology conversations. The first kind of conversation is typically with reporters, educators, or those interested in the latest, bleeding-edge innovations. They always ask me (or others), "Does it work?" They are not referring to its functionality; rather, they are trying to get at whether it works *better than* whatever technology came before it or whatever practice is currently in place. For instance, they might ask, "Does virtual schooling work better than face-to-face education?" Or they might question, "Do technology-based reading interventions work better than those without technology?"[2]

The second type of conversation relates to companies, schools, and grant writers who are trying to figure out the impact of their work. Sometimes they are looking for ways to prove that their product or intervention works, and they know the end statement they want to make. For instance, they want to say, "We know this product significantly improves science learning." In other cases, they may not be aware of the end statement; they only know they have a *feeling* that they need to create, develop, and/or implement a product, process, or strategy. They want proof to match their emotional instinct, or they may want to convince others so that they can receive grant funding.

Regardless of the context, people have questions about the impact of digital innovations; they are looking for answers. The lesson for those interested in the relationship between society, culture, and technology is that digital technologies and related processes can and should be measured to help understand, predict, and respond to these questions.

SO WHAT?

There is nothing inherently wrong with the intentions behind these questions. Arguably, it is important and necessary to ask and answer important questions about the impact of society and culture on digital innovations. These questions also help us explore the effects of digital innovations on society and culture. Questions justify our planned work and help set the stage for demonstrating overall outcomes. They can help us figure out whether technology investments are worth the cost, how to increase link conversion rates on websites, and whether adding transparent buttons will decrease support calls.

However, there are two issues that these questions point to that are of immediate relevance and importance for digital scientists, developers, and educators. First, these questions will get asked, and there will be an expectation that answers are provided. This seems to be stating the obvious. However, many people

interested in technology or with digital innovation careers adopt the "not my job" mind-set. They will argue that measuring the impact of innovations is a specific set of skills assigned to evaluators, statisticians, quality managers, or administrators.

In one sense, this is correct. There are a specified set of skills used by evaluators that have been honed through training and experience. Not everyone has the ability or education to do statistical regressions or to plan detailed inquiries; not every educator, researcher, or developer knows the difference between a summative and formative evaluation (or how to conduct either). Bob Stake[3] notes the following:[4]

> No two professional evaluators are the same but many use similar methods. Still, each of us will use a method in a somewhat idiosyncratic way. Especially in the interpretation of data, personality and experience have a play. Professional evaluators come from many backgrounds. They have greatly different aspirations. As a group they are considerate people. They are ethical. They follow disciplined procedures to find the merit and worth of a program or other object. Oh, there is a rogue here and there. He or she may go where the money is. But most of us evaluators are good people, most of the time. We are specialists at recognizing differences among greater and less quality. We hope that our work will contribute to the making of a better world.

Not everyone will serve as an evaluator. On the other hand, every successful technologist does some level of evaluating—often on a daily basis. These evaluations often take the shape of quick decisions that may only have short-term impact. Evaluations may also come in the form of needing to assess and decide on a technological creation, process, or solution that could fundamentally make or break the project. In still other cases, a supervisor or colleague might ask for insight in predicting emerging trends, desired product features, or appropriate technology purchases. These decisions are admittedly not the same thing as full program, project, or product evaluations that are often hired out to external evaluators. But it is a mistake for

those interested in digital innovations to assume that evaluation is not their job.[5] Moreover, one could argue that being able to assess a situation and provide data to support a decision is a character trait that has been and will be valued in many 21st-century jobs.[6]

A second issue related to seeking and finding answers rests in the questions themselves. I suggested a few paragraphs earlier that there was nothing necessarily wrong with the *intentions* in asking about the impact of digital innovations. I agree that we need to understand the impact of technology on society and culture (and vice versa). However, I would argue there are problems with the way in which the questions are typically worded. In most cases, the questioner wants a yes-or-no answer to a question about the effectiveness or impact in a given environment. Unfortunately, it's the wrong question because it is asked as a yes-or-no question or it is asked in a way that seeks definitive answers in all cases. The outcome is most likely *not* going to be answered with a conclusiveness yes or no. Even in those cases where data supports a yes-or-no answer, the best you have done is to answer what happened and not why. A much better question is, "Under what conditions does this technology work or fail to work?"[7]

This process is perhaps best explored by examining the rise and prevalence of K–12 virtual schooling in the United States. Some of my early work had been online postsecondary education. My entrée into K–12 online and blended education came in 2004 when I read a piece by Cathy Cavanaugh and her colleagues that essentially attempted to address the issue of comparing face-to-face and online K–12 education.[8] Cavanaugh et al., in my humble opinion, completed a rigorous exploration of the issues. They essentially found no significant difference between online and traditional offerings. Said differently, students engaged in online learning did as well as (and in some cases, better than) those in face-to-face classes.

I joined the academic conversation shortly thereafter through my own research funded by partners like the North Central Regional Education Laboratory[9] and BellSouth[10] (later AT&T), as well as through publications like the *Handbook of Research on K-12 Online and Blended Learning*.[11] It amazed me that even five years after Cavanaugh et al.'s seminal work, people were still asking me (and probably Cathy and her team) for specific evidence tilting the scale. They wanted concrete evidence that would *prove* that K–12 online learning should definitely be implemented for all learners or should be avoided at all costs.

To quote the great American "philosopher" and lyricist, Jimmy Buffett, the truth is that "it's not that simple."[12] Cathy's research as well as work done by a variety of others in the field have clearly demonstrated that there are conditions under which students can be very successful in K–12 online learning. There are other cases and other factors where students are not ready or not well suited for learning in these environments. This is a critical point, because asking, "Under what conditions?" sets the stage for further explorations that get at factors for success like home situations, mentoring, technology skills, online pedagogy, and orientation activities. It helps to avoid seemingly pointless (and yet still existent) arguments that pit the "always works" against the "it never works."

Another example comes from the work of those interested in video games. There are a number of different fields and disciplines interested in digital games ranging from computer science and education to psychology and literary studies.[13] It is also an area where research transcends academic life and quickly becomes a focus of attention in the popular press. For instance, you can find multiple examples of newspaper, magazine, television, and website articles asking researchers about the relationship between video games and physical health, mental health, and learning. They are looking for specific evidence about the direct impact of playing video games.

What is fascinating is that, at least on the surface, the answers from the research seem so diverse, varied, and polarized. For instance, one study suggests that video games can lead to obesity;[14] a second praises games for energy expenditure.[15] Another study suggests that playing video games can lead to aggression;[16] a counterpart says they are good for mental health.[17] Left to such a description, one would think the field is schizophrenic. If you dig deeper, however, you will see that the conditions help explain these seeming paradoxes. The reality is that the type of video game played (e.g., active or passive, violent or nonviolent, etc.), the player, the conditions, and the amount of time played are all important factors that can change the effectiveness or impact of video game use. This sounds like common sense; however, this has not stopped mass media from picking definitive sides and painting video games as either decisively good for you or resolutely evil.[18]

NOW WHAT?

The lesson here is that digital technologies and related processes can and should be measured. This is important for those interested in society, culture, and technology because they will be asked questions and should be prepared to analyze, assess, and evaluate innovations. This can occur on a large stage with critical long-term implications; it also occurs on a daily basis in decision-making related to tasks. When asked to do so, it is critical to understand and address how the question is being framed. And if necessary, it is important to reframe or reshape the question so that it is both answerable and appreciative of the conditions and factors that might impact the outcomes. Understanding these two points is an important implication; there are four related next steps that build upon these statements and tie to the "now what?"

First, becoming effective at evaluating innovations like products or processes takes experience. However, outside of actual

evaluative practice, a great way to prepare is to read research articles and evaluation reports. Many technologists read pop press highlights of new tools; far fewer actually read research articles, white papers, or reports. Those who do read such papers often do so only for the sake of understanding the innovation or the outcome. Keen eyes should read such articles while paying close attention to the methods and tools used to study the innovation. The methods sections will provide examples (some positive, others not) that could be replicated or avoided.

It is worth noting that there are seminal readings in the field that relate to these ideas presented in this chapter. For instance, Gavriel Salomon and Howard Gardner[19] wrote a piece discussing the importance of addressing specific technology characteristics; Richard Clark[20] wrote on the dangers of comparing media; and Clifford Geertz[21] presented ways to thickly and richly describe contexts. Such readings are critical to a foundational understanding of doing quality research and evaluations. The advice in this implication, however, relates to *additionally* looking at research studies and their methodology sections to learn from their successes and failures.

This implication also refers to taking a historical perspective (chapter 2) in those readings. If it has "all been done," then questions—particularly about making predictions in the field—could be better informed by examining historical data and outcomes. Anyone interested in comparing and predicting the success of two competing and innovative technologies (e.g., two different augmented or virtual reality goggles) might benefit from remembering and exploring past examples ranging from Betamax and VHS to HD and Blu-ray, and from Atari and Commodore to the more recent console wars (e.g., Sony, Microsoft, and Nintendo).

Second, becoming effective at decision-making through evaluating data also requires an understanding of the concept

of *metric*. *Merriam-Webster* defines metric as "a standard of measurement."[22] Researchers will often also refer to this as the *unit of analysis*.[23] In order to evaluate or even to collect data to make a decision, it is necessary to decide what measure or metric you are using to show growth or change. For an educator, improvements in math scores may be determined by the metric of a standardized test or a validated instrument. A human-computer-interaction specialist may examine changes by using improvements in click conversion as a unit of analysis. A business analyst might collect data on specific sales reports to show changes. This is another implication that is steeped in common sense, but it is often ignored as people seem to focus solely on the big picture. They want improved learning, more interest, better feedback, and so forth, but they fail to dig deeply to explore and/or understand what it is that is actually improving or changing. They often fail to identify the metric or unit of analysis; in doing so, they limit their ability to be able to measure change.

A third implication refers back to a deeper understanding of the relationship between society, culture, and technology as described recursively in chapter 1 and historically in chapter 2. It is critical to determine a metric or unit of analysis for understanding impact. However, it is important to understand that innovations also have *unintended* consequences. Missionaries hoping to improve living conditions of remote tribes were presumably not intending for those same innovations to destroy their culture. Educational television producers intent on using the medium to inform viewers were arguably not intending for young children to become addicted to television. (Conspiracy theorists might disagree with these last two statements.) The point is that it is critical for digital scientists, educators, and developers to recognize and prepare for the fact that their innovations will have unintended societal and cultural consequences that are both positive and negative. It is important

to have metrics but also to be open to measuring and exploring unintended outcomes.

A fourth and final implication is that digital scientists, developers, and educators should continue with their lifelong learning to achieve a deeper appreciation of using statistics, data, and other research and evaluation tools to make decisions. Learning more about data-driven decision-making does not have to be an expensive proposition due, in part, to the relatively recent phenomenon and popularity of massive open online courses. Massive open online courses (MOOCs) are free online courses; some of the larger and more notable course providers include Coursera,[24] edX,[25] and Udacity.[26]

> When participants enroll, they typically attend a 4-15 week course with anywhere from a few hundred to 100,000 other participants. It is free in the sense that anyone can join as long as they have access to the Internet. Typically those who complete the MOOC receive a certificate of completion (with or without a set of virtual badges); in some cases, participants can also pay to receive professional development, college, or graduate credit. Most MOOCs have been aimed at post-secondary or professional development audiences, although recent MOOCs have attempted to include K-12 students.[27]

There are a number of courses in methods, conducting evaluations, and statistics. Others who prefer reading to a formal course structure can find textbooks related to similar topics through the Open Textbook Library.[28] There are also program evaluation guides online that walk learners through various data-collection techniques.[29] Regardless of the approach, the idea here is to gain a deeper and broader understanding of proper ways to collect data to make informed decisions. Such preparation will help digital scientists, educators, and developers regardless of whether the evaluation is a minor, quick assessment or a larger one used to make predictions that will inform corporate vision statements.

Notes

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LESSON 4

You Keep Saying That

Vizzini: He didn't fall? Inconceivable!

Inigo: You keep using that word—
I do not think it means what you think it means.

—Vizzini and Inigo Montoya in the film *The Princess Bride*[1]

WHAT?

In the film *Being There*,[2] Peter Sellers plays the role of Chance, a slow-witted gardener to a wealthy businessman. The rich man dies leaving Chance homeless and wandering the streets. He is eventually hit by a car of a second wealthy business owner. As he is nursed back to health, Chance engages with his benefactors and their high-society friends using gardening terms (outside of what he sees on television, that is all he has ever known) to respond to everything from political to financial questions. For instance, the economy can be stimulated "as long as the roots are not severed"; and there is optimism for the country because "there will be growth in the spring!" Hilarity and introspection ensue as the viewer holds the secret of Chance's true intentions compared to everything people read into his words.

The technology field is similar in many ways. (If you disagree, hit me with a DM, although we'll probably A2D and I'll headdesk IRL.[3]) There is so much lingo and jargon that one could easily become lost in translation. There are terms that get quickly and

widely adopted—sometimes without any clear sense as to what they mean or even if their use is justifiable (as Inigo would say in *The Princess Bride*, I do not think it means what people think it means). As quickly as they seem to appear, the words are then replaced or misappropriated and given new meanings. It's a linguist's dream (or nightmare?[4]).

It is not all chaos. The flip side of the seemingly ever-changing lingo is the standards that exist in the field. Digital scientists, educators, and computer scientists have worked hard to build standards that help guide research and practice. Not everyone agrees on all standards; some disagreements have led to "wars" that have had commercial and other implications (e.g., HD DVD vs. Blu-ray). But standards do help in getting everyone on the same page (even if it is to disagree). The lesson for those interested in the relationship between society, culture, and technology is that there are rules, standards, and definitions inside and outside of the field that can help govern future work.

SO WHAT?

There are three main reasons why digital scientists, educators, and developers need to pay attention to terms, definitions, and standards. First, terms (and their definitions) can go a long way toward either helping or hurting the implementation and dissemination of digital innovations. Sometimes the use of jargon and terminology can't be avoided. Terms were created to mean certain things and to differentiate processes, contexts, and concepts. The use of terms can clarify, improve efficiency, and create a shared experience.

At other times, buzzwords and jargon can exclude users from being an important part of the experience. Digital technology creation and implementation is typically interdisciplinary (see chapter 10). As such, engagement with experts from other fields is imminent (and recommended!). Terms can be unknown between fields or disciplines; terms and definitions can also

differ between fields. A *keyboard* to a computer scientist is different than a keyboard to a music educator. The word *plane* is used differently by air traffic controllers and mathematicians. The role of a digital scientist is to both appreciate the value of specificity while at the same time ensuring the accessibility of language use.

A second reason this lesson is important is because standards are tied to educational and vocational outcomes. For instance, hypertext markup language (HTML)[5] is a standard system for creating, editing, and modifying how text appears in web pages (a simple definition). Someone wanting to learn how to create a web page using HTML would not only learn the system, they would also learn the specifications and tags associated with the larger standard. They would find that <hr> is a standard code used by all HTML users for creating a horizontal rule (imagine a line separating text). (Coders reading this will correct me and say that the rule is only applicable in version 4.0; in the latest version of HTML5, <hr> creates a thematic break. I purposely use that example to show the importance of understanding standards and staying in touch with changes to those standards.)

Or imagine you are learning to become a teacher who is proficient in the use of educational technology. The International Society for Technology in Education (ISTE) has created standards for teachers.[6] For instance, according to the definitions in their standards and on their website, "educators dedicate time to collaborate with both colleagues and students to improve practice, discover and share resources and ideas, and solve problems".[7] This should include being able to "demonstrate cultural competency when communicating with students, parents and colleagues and interact with them as co-collaborators in student learning".[8]

Anyone could choose to study programming languages and tools beyond or instead of HTML. Someone deciding to become an

educator who uses technology could decide to adopt other standards besides those recommended by ISTE. Standards are not always agreed upon or selected by everyone. But they do exist and are useful in at least setting the stage for a deeper discussion about implementation, uptake, or revision. Sometimes the coding standards seem more recognizable and easier to learn or adopt because students are learning them as they are learning to code (e.g., HTML). Compare that to more theoretical or conceptual standards that are often unknown (even those in the industry; e.g., not every teacher knows the ISTE standards).

A third important reason for understanding terms and standards is their importance in addressing ethics in digital innovations. You cannot create enough standards or mandate sufficient adoption of them to prevent all ethical dilemmas. By their definition, ethical situations are often tied to personal decisions and choices. However, standards can be applied to some situations that may help alleviate certain ethical predicaments before they arise.

Consider data collection. Pretend, for a moment, that you are a game developer who is creating an online game for children. You quickly recognize the importance of collecting their data. For instance, you need to create log-in information so they can join the game from anywhere without losing their data. You can make a strong argument that data analytics[9] will also provide better in-game performance and relatable content for the user (which may or may not result in greater sales and/or learning outcomes). At some point in the development process, however, you are going to come to the conclusion that there is a significant risk associated with capturing and keeping such data. *What happens if that data gets stolen? What happens if parents or teachers want access to that data to make their own education decisions?*

My hope is that, as a game development company, you would have already been aware of the Federal Trade Commission's Children's Online Privacy Protection Act (COPPA).[10] COPPA provides insight into what data can be collected with and without parental consent. Being aware of COPPA and abiding by its regulations would inform many ethical decisions and considerations companies may have to make on their own.

This example is not meant to sound like a call for government intervention in every digital innovation. I do believe there are opportunities for legislation to help regulate technology development and implementation (e.g., child safety, privacy, and copyright). There are also standards created by organizations, businesses, and academic groups that can prevent or at least assist in other ethical dilemmas. At the end of the day, however, there are going to be some ethical decisions that are going to have to rest on the laurels of the decision-makers.

It is worth noting that this third rationale for the importance of this lesson has focused on standards in relation to ethics. However, terms and definitions can also play a role in making decisions about ethical issues or concerns. This occurs most often when companies, employers, and educators fail to come to agreed definitions of key terms that set the stage for development and dissemination. Digital scientists can also avoid some dilemmas by ensuring the proper use of terms and their shared definitions.

NOW WHAT?

The lesson addressed in this chapter is digital scientists, educators, and developers can positively and proactively use terms and standards. This is an important lesson because it acknowledges the nonuniversality of terms and definitions, it raises awareness of industry and government standards, and it supports the use of both for dealing with potential ethical

concerns and issues. There are at least three major implications for this lesson.

First, there is no way to prepare for every ethical dilemma or situation that might arise in education, business, or government. On the other hand, it is unwise to pretend like every future vocational or educational decision is going to be black and white. Anyone interested in the relationship between society, technology, and culture should spend more time deeply understanding and appreciating hypothetical and historical examples of ethical dilemmas in their chosen field—preferably before they happen in real life.

The best way to do this is to examine case studies. Case studies are detailed stories that are used across various learning environments to help learners analyze a process, skill, or context.[11] There are numerous examples that can be found online; one resource is the Markkula Center for Applied Ethics at Santa Clara University.[12] Their website contains multiple case studies of ethical situations across multiple content areas (e.g., business, engineering, journalism, and social sciences). The cases provide opportunities for students to dig more deeply into dilemmas they may encounter in the future:

- Should business leaders capitalize financially on disasters?
- What are your responsibilities if you think the technology you're creating could be used for cyberattacks?
- Is it your responsibility to inform your client of a competitor's product that more closely matches their needs?
- Do you have to report data from a study that negatively portrays your product?
- Is it OK to receive perks from suppliers?
- Can a company morally target users with information it collects unbeknownst to the user?

This is not the only website to provide case studies or to provide insight into the ethical decisions that technology leaders must make. There are also thousands of videos on YouTube that use film and actors to show such scenarios. The idea here is that future and current digital innovators must be aware of these ethical issues and should be prepared in some way to respond to them.

There is a serious note that needs to be added to this first implication. Gabriella Green,[13] Rehtaeh Parsons,[14] and Audrie Pott[15] all received unfortunate international recognition. They were all young students who committed suicide after being subjected to some form of cyberbullying.[16] Their names join a list of way too many youth and adults that have taken their lives due to bullying through social media. Digital scientists and educators have a special call to be aware of the ways in which their innovations or their digital implementations may consequently be used for ill.

A second important implication is to seek out and become aware of government or industry standards in your field. COPPA, ISTE's educator competencies, and HTML are all examples of standards provided in this chapter (that, incidentally, may or may not be used to address ethical issues). There are countless other examples of government, industry, and education standards in fields ranging from journalism to computer science and from health to environmental studies.

Sometimes these standards are created and adopted to ensure that development processes and outcomes are consistent between builds. You wouldn't want your mobile application app to not work on its intended platform; or, you wouldn't want your paper to be rejected for a conference presentation because you didn't follow proper citation requirements. Other standards are created based on recommendations and best practices (e.g., how to teach online, how much television your 2-year-old should

watch, and the proper way to mix dry martinis). Anyone currently working in the field or interested in gainful employment in an area should be aware of the multiple types of mandated and suggested standards used.

A third recommendation relates to the use of terminology. I have already made the case that proper or improper use of jargon and terms can either lead to efficiency and a shared work agenda or confusion and delay. This is particularly tied to the relationship of society, technology, and culture because different societies, cultures, and subcultures assign different meaning to different terms (*How many words do Eskimos really have for snow and does it even matter?*[17]).

This all leads to the point that digital innovators must be very careful in the choice and use of terms. Take the example of the term *digital native*. Marc Prensky is given credit for using the term in a 2006 book[18] (although some give credit elsewhere) to refer to a generation that has grown up in the Internet and digital technology era. I like Marc and what he has done for digital game-based learning. However, I dislike the term *digital natives* because of its overuse and misappropriation of meaning. I have watched supposed digital natives who can't keep their face out of a smartphone and yet have no idea how to use technology to learn, communicate, or protect themselves. I would be considered naïve if I didn't know what the term meant; but simply knowing the term does not mean it deserves to be used or repeated in perpetuity.

The recommendation for caution in term use is also extremely relevant for developers. Developers may have the hidden belief that a technology is developed in isolation and then implemented into an environment where it either flourishes or flops. If I put the statement in writing, as I have done in the previous sentence, many developers would disagree. However, their actions in development often suggest otherwise. There is often an

unwillingness on the part of developers to engage the intended audience in the development stages (see the ADDIE model in chapter 1). It could also arguably be a lack of recognition of the importance of audience participation.

Conversely, researchers have provided significant evidence that successful implementation is really a recursive dialogue between developer and future user.[19] A developer might complete a long series of iterative designs and feedback loops to make sure the intended user and the developer have shared definitions of the goals, needs, and outcomes. If this practice truly leads to success, then developers have an extra burden of making sure that they are not using terminology that excludes audience participation and feedback.

A fourth and final[20] implication that was hinted at earlier is timing. Terms, definitions, and standards change. Digital scientists, educators, and developers must find ways to continually stay updated on these changes. This is often done through social media, by attending conferences, or by joining the email lists of various organizations (see the importance of making and utilizing your network in chapter 7).

Notes

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6. International Society for Technology in Education. (2017). *ISTE standards for educators*. Retrieved from https://www.iste.org/standards/for-educators

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14. White, J., & Kral, M. J. (2014). Re-thinking youth suicide: Language, culture, and power. *Journal for Social Action in Counseling and Psychology*, *6*(1), 122–142.

15. Burleigh, N. (2013). Sexting, shame and suicide. *Rolling Stone*, *1192*, 48–55.

16. For Rehtaeh and Audrie, cyberbullying happened in combination with or after assault.

17. Martin, L. (1986). "Eskimo words for snow": A case study in the genesis and decay of an anthropological example. *American Anthropologist*, *88*(2), 418–423. Also see Pullum, G. K. (1991). *The great Eskimo vocabulary hoax and other irreverent essays on the study of language*. Chicago, IL: University of Chicago Press. And see Robson, D. (2012). Chilly words: How Eskimos really say 'snow'." *New Scientist, 216*(2896–2897), 72–73.

18. Prensky, M. (2006). *Don't bother me, Mom, I'm learning!: How computer and video games are preparing your kids for 21st century success and how you can help!*. St. Paul, MN: Paragon house.

19. Zhao, Y., Englert, C. S., Jones, C. S., Chen, J., & Ferdig, R. E. (2000). The development of a web-based learning environment: A dialogue between innovation and established practices. *Journal of Research on Technology in Education, 32*(4), 435–454.

20. There is a fifth implication related to a further exploration of society's willingness and ability (or inability) to create shared definitions. There isn't space in this volume to address the topic, but it is handled nicely in the context of society, culture, and burnout in Schaufeli, W. B., Leiter, M. P., & Maslach, C. (2009). Burnout: 35 years of research and practice. *Career Development International*, *14*(3), 204–220.

LESSON 5

I Wish You Were Here So I Could Be Alone

Now that you have gone
and I am alone and quiet,
my contentment would be
complete, if I did not wish
you were here so I could say,
"How good it is, Tanya,
to be alone and quiet."

—Wendell Berry[1]

WHAT?

One of my hobbies and joys is to spend any available free time in the great outdoors. I have been blessed to see deer nurse, birds build nests, and foxes chase their prey. I have heard the sound of a tree falling in the forest; I have watched a creek freeze. I have been witness to countless, indescribable sunsets and sunrises. After each breathtaking moment, I find myself—like Wendell Berry—feeling the juxtaposition of wanting to share with someone how good it was to be alone.

Enter 21st-century digital technologies—specifically social media. Never have people been so connected and, at the same time, so distanced. On one hand, innovative technologies are often praised for their ability to connect people. I remember fishing with an old friend named Solon on the St. Marks River in Florida. *Old* here refers to both the age of our friendship and my

friend's senior status. Things were peaceful and unfortunately quiet on the river that morning. He broke the silence by suggesting that technology was remarkable. He went on to tell me about a time when he was fishing off the Florida coast earlier that year. He had caught a decent-sized fish and took a picture. Using what even he described as an outdated phone, he was able to immediately send that picture to his nephew in Texas. The nephew quickly responded, and they were able to *share the moment in the moment*. Researchers provide data that acknowledge such positive outcomes, suggesting that such digital connections can support existing relationships and can lead to new connections and friendships.[2]

On the other hand, such technologies can also lead to isolation. A study published in 2017 measured social media use and compared it to perceived social isolation.[3] Participants in the study—adults between the ages of 19 and 32—"were asked to report frequency of their use of each of 11 widely used social media platforms, including Facebook, Twitter, Google , YouTube, LinkedIn, Instagram, Pinterest, Tumblr, Vine, Snapchat, and Reddit" (p. 3). Those data were then compared with a social isolation metric designed to measure "perceptions of being avoided, excluded, detached, disconnected from, or unknown by others" (p. 2). Researchers found that increased social media use was connected with increased perceived social isolation. The more they used those tools, the more alone they felt.

It is worth noting that in the 2017 study mentioned here, positives *and* negatives were acknowledged. Digital connections could lead to sustained friendships while at the same time potentially constrain off-line conversations. Increased social media use could lead to increased perceived social isolation; however, the same researchers did suggest that (in some cases) using social media might be a good way to derive social benefit (e.g., for those with health conditions or geographical isolation).

The point is that digital technologies change our relationships with others and ourselves. Sometimes this is positive, leading to increased connection and community. At other times, this can lead to isolation, loneliness, and depression. The lesson for those interested in the relationship between society, culture, and technology is that digital technologies provide new opportunities for engaging with others, which can bring both positive and negative outcomes.

SO WHAT?

There are at least three reasons this lesson is important. First, this lesson is a great reminder of the assumptions people have about innovations. For instance, societies and cultures have seemed to perpetually wrestle with the *goodness* or *evil* of technologies (digital or otherwise). More specifically in education, digital technology "seems to be under scrutiny for some inherent abilities to help teachers teach, help learners learn and fundamentally change the social and educational context of classrooms" (p. 749).[4]

My soapbox had always been that technology is relatively neutral outside of its use, implementation, and outcomes. This was evidenced in chapter 3 when I suggested that K–12 online learning and video games were both salient examples of topics that required a deeper and broader understanding of the conditions of their use. Although the point I was making in that chapter was methodological, my argument was against labeling any digital tool as consistently useful or dependably flawed.

I have recently been challenged to rethink my position by meditating more deeply on the theological facets of this question. For instance, Derek Schuurman takes a Christian perspective in his book *Shaping a Digital World: Faith, Culture, and Computer Technology*.[5] He suggests that technology, like all of creation, has fallen. Although it has potential positive value, it also needs to be

redeemed. Different faiths and religious groups obviously have their own perspectives (e.g., authors have re-examined perceptions of Amish views of technology[6]).

A faith-based perspective on technology is discussed in greater detail in chapter 10. The point here is that regardless of whether you view technology as neutral or fallen, we have a tendency to polarize our perspectives on specific digital innovations. Perhaps more importantly, our positive or negative view is significantly tied to our interest in, belief about, or use of that tool or strategy.[7] That, in turn, blinds us to the potential positive or negative intended and unintended consequences of implementation and use.

For instance, Facebook can be negatively associated with well-being[8] while at the same time satisfying human psychosocial needs.[9] Social media can isolate people while at the same time augmenting their relationships.[10] Online media can be a prime source of news; it can also be distrusted as containing false information (e.g., fake news).[11] These are all examples of why digital scientists, educators, and developers must be aware of both the positive and the negative potential outcomes of their developments or implementations. They must also be aware of the biases they bring to assessing the innovation.

A second reason this lesson is important is because digital media are instrumental in the evolution of our relationships with others. There is fascinating research being conducted, for example, in the area of technology and love (e.g., online dating). Researchers have found that biological and personality traits impact the use and gratification of dating sites.[12] Anonymity in online dating sites reduces the quantity of matches made while failing to necessarily improve the quality of matches.[13] And there is evidence that daters feel they would be more successful meeting their partners online.[14]

The studies are not all focused on romantic love. For instance, there is evidence that online conversations and friendship-making could potentially lead to reduction in prejudice.[15] Social-based technologies can lead to self-disclosure online, further impacting off-line interactions between close friends.[16] And online conversations can be important to the growth in communication skills of children with autism.[17] (For full disclosure, an exploration of romantic love technologies may produce some of the more "interesting" products and related articles. Consider, for instance, technologies that allow you to virtually bowl or virtually drive a race car based on how well you kiss your partner.[18])

Regardless of the platonic or romantic nature of the studies, existing research confirms the important impact of digital innovations in our relationships with others. Given the recursive nature of the relationship between society, culture, and technology, research also points to how such relationships then drive the desire for future technologies (or features within technologies) to build and sustain those ties.

This impact has deep psychological roots and underpinnings.[19] There are terms that help define why technologies are impacting our relationships with others (and vice versa). Modern innovations, for example, help us connect with others who share common attributes. Researchers call this *homophily*.[20] Technologies are often used because they help us connect with old friends *or* find new people who engage in similar activities or who have the same interests. Think about Facebook and high school friends who reconnect because they share a common history. The same could be said about Pinterest and how people find others who share similar hobbies.

Psychologists also point to a concept known as the *misattribution of arousal*.[21] In situations that are highly emotional (e.g., fear, stress, anxiety), people will often associate the arousal with a

person who shared the experience. Consider video game play. Video game developers continue to create more and more realistic and emotion-spiking realities. Friendships and romantic relationships can be formed or enhanced due to the shared experiences of these players.[22]

A final example of the psychological impact on our relationships comes from a term known as *experience-taking*. Geoff Kaufman and Lisa Libby[23] suggest that "readers lose themselves and assume the identity of the character, adopting the character's thoughts, emotions, goals, traits, and actions and experiencing the narrative as though they were that character".[24] I would suggest that a reader here could be engaging with a book, a movie, a video game, or a virtual experience with others. In doing so, they begin to try out new roles, characteristics, and actions. These outcomes can then inform their interactions with others, particularly if they are engaging with those others as they try out new experiences.

Homophily, misattribution of arousal, and experience-taking are just a few of the many psychological concepts and labels that researchers are exploring. They are listed here as examples because they help explain the depth beyond the technology interaction. It helps put a theory behind why and how the digital innovation is impacting our relationships with others (and vice versa). It may also then help explain the potential future uptake of new technologies (or features of digital innovations).

A third reason to pay attention to this lesson is because digital innovations are changing our relationships with technology. That argument may sound circular, highlighting the fact that technology is influencing technology. Here, however, the focus is on our relationship with technology. Much like our relationships with others, new innovations continue to influence our relationship with technology. Researchers call this the *media equation*.[25] You can arguably take any social science finding,

replace one of the people with a computer, and essentially get the same result.

For instance, in their seminal work on the topic, Byron Reeves and Clifford Nass[26] examined politeness. Imagine someone giving a speech. At the end of the speech, social science research tells us that an audience member would be more polite in evaluating the speech if they were addressing the speaker than they would be if they were engaged in conversation with others.

The authors replicated this work with technology as the other partner. They began by using a computer to deliver a tutorial. They then split the subjects into three groups and asked them to evaluate the tutorial. One group evaluated the tutorial using a paper survey, the second used a different computer, and the third group evaluated the tutorial on the same computer used in the tutorial. They found that people were more polite to the computer in the third group—the group that was doing the evaluation on the same computer as the tutorial.

Said differently, they were able to replicate the social science finding that addressed interactions between two people after having replaced one of the people with a technology. Other researchers have replicated this work and substantiated this finding. One study even showed that users had visceral reactions to machines (e.g., spite), attempting to seek revenge even in the face of personal loss for doing so.[27] These studies highlight how technology is changing how we relate to and how we personalize digital innovations.

NOW WHAT?

Digital technologies provide new opportunities for engaging with others. This is an important lesson for educators, digital scientists, and developers because it highlights the biases people bring to innovations—often addressing them as having good or evil intent in those current and future relationships. More

importantly, whether we like it or not, it moves beyond just opportunities for engagement. Digital innovations are changing how we interact with others; they are also changing how we interact with current and new technologies. Such outcomes have obvious implications for developers, particularly for those who are building virtual and augmented realities. Namely, we have to be aware of the ways in which people engage with others (real or virtual), who they may want to engage with, and the intended and unintended consequences of those interactions with real and digital others. There are two other critical implications and next steps.

First, there is value in conducting a thorough self-examination of one's dependence on digital innovations. I really do enjoy studying, building, and testing bleeding-edge innovations. But, I am also someone who abhors sitting in a restaurant and watching people with their face stuck in their devices. I can't stand it when people walk through parks ignoring beauty and wonder because they are jabbering on their phone in speaker mode. I wholeheartedly agree with Richard Louv's notion that we are depriving the wired generation of nature.[28] It makes me enjoy reading stories from people who attempt to *quit the life*, even for a little while.[29]

You may be preparing to tell me to come out of the Dark Ages; you'll ask me to give up running water, indoor plumbing, and my refrigerator if I really meant what I said. And I would understand your point. We have become so dependent on technology that most people could not truly live for very long without it. Based on the definitions in this book, it would be impossible to live without them.

The point, however, remains. A thorough self-examination is worthwhile if solely for the opportunity to explore the frequency and dependency of digital innovation use within your existing relationships. Some people may find they have an appropriate

balance of using technologies to support healthy off-line and online behaviors. Others may find more toxic outcomes and a need to seek help[30] (e.g., Internet addiction disorder[31]).

There will be additional benefits of such explorations for educators, digital scientists, and developers. It will provide an opportunity to examine if, how, and when intended audiences use innovations within given environments. *Are they used to communicating and engaging with others using tools not being used in your environment (e.g., classroom or office)? Are there new tools and innovations that could potentially positively or negatively impact communication and collaboration? Do new innovations lack features that could be implemented to improve existing or future relationships?* Such explorations can help provide answers to critical decision-making and planning.

A second implication for those interested in society, technology, and culture is the need to develop personal definitions for identifying positive and negative technology uses. It is not enough to simply be aware of biases toward certain tools or strategies. One must have a deeper understanding of minimum and maximum thresholds for use and/or abuse. The extreme limits are the easiest to set. For instance, most would agree that a complete lack of awareness of how to use a telephone is probably not in anyone's best interest. Conversely, dying from a three-day video game binge is probably not a good idea either.[32]

Creating definitions is related, in part, to the importance of understanding the concept of metric discussed in chapter 3. These metrics for acceptable use can be both personal and professional. They can be set individually, as a family,[33] or they can be adopted from agencies and organizations (e.g., the American Academy of Pediatrics[34]).

A professional example comes from education. Technology integration committees at a school might decide that pedagogy,

people, and performance are important metrics for deciding to adopt new tools for communication and learning.[35] Pedagogy, referring to teaching and learning, could be evaluated as positive if the new tool provides opportunities for students to engage in authentic, real-world problems[36] while they collaborate with others.[37] The technology could also be an important addition to the curriculum if it supports the flexibility of the teacher in her instructional needs,[38] particularly if it opens up opportunities to engage parents. Finally, an educator or committee might view a new innovation as positive if it provides cognitive assessments of student learning.[39]

This is a simple example from one profession. However, the point remains that technology is changing our relationships with others, with ourselves, and with how we engage new innovations. Metrics or limitations for positive and negative uses will help us continuously examine what is working and what needs to change in our personal and professional environments.

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LESSON 6

I Am Your Father's Brother's Cousin's Dog

Dark Helmet: Before you die, there is something you should know about us, Lone Starr.

Lone Starr: What?

Dark Helmet: I am your father's brother's nephew's cousin's former roommate.

Lone Starr: What's that make us?

Dark Helmet: Absolutely nothing. Which is what you are about to become. Prepare to die.

—Dark Helmet and Lone Starr in the film *Spaceballs*[1]

WHAT?

There is a famous *New Yorker* cartoon by Peter Steiner that shows two dogs—one is in front of a computer talking, and one is on the floor listening. He tells his friend, "On the Internet, nobody knows you're a dog."[2] The cartoon was printed in 1993 at a time when information about the Internet user was privately held and anonymity was *almost* assured. In other words, you could be a dog pretending to be a cat and no one would know. For that matter, as far as anyone was concerned, you could be your father's brother's cousin's dog (or his former roommate).

This chapter is not about Internet privacy or changes that have occurred since the 1993 cartoon, although that is a topic worthy

of additional study. Entire volumes have been and will continue to be written about how much privacy we really do or don't have with modern technologies (*Is the government really using my webcam to spy on me?*[3]).

It is also not about anonymity. Incidentally, there are fascinating studies based in psychology and other related fields about what people do (or what people post) when they think they are anonymous. For instance, some users prefer anonymity to avoid being associated with embarrassing situations or topics.[4] Others maintain anonymity to protect their research subjects.[5] And still others do it to mask their true identity for illegal or illicit behavior.[6]

Rather, this chapter addresses the topic of our online personal and professional identities. The reality is that the first things people often learn about us are based on what we or others post about us online. It is common for someone to do a Google search before ever meeting someone face-to-face or before having a phone or video call. Social networks promote this reality because we "meet" other people through connections that we seek out or that social media encourages us to explore.

Hey, I see you share five friends with this person. Maybe you know them?

Even if you don't know them, you might be tempted to click on their page, see their photos, or read their tweets. The lesson for those interested in the relationship between society, culture, and technology is that innovations shape and change how, why, when, and where others see us or learn about us.

SO WHAT?

This is obviously an important lesson for those interested in the relationship between society, culture, and technology because online information sharing and seeking, whether by personal

decision or promoted by social media, can be both positive or negative. It can lead to the development of new friendships and love (see chapter 5) just as easily as it can lead to pre- and ill-conceived notions of a person, avoidance, not getting hired for a job, losing gainful employment, and so forth. There are three more specific theoretical and practical reasons why this lesson matters.

First, psychologists often refer to a personality or identity concept introduced by Charles Cooley in 1902 called the looking-glass self.[7] The basic idea is that how I see myself is influenced by how others see me. Perhaps more precisely, how I judge myself and how I continue to develop is based on how I perceive others seeing and judging me and my appearance.

This quickly becomes complex due to my social surroundings and personal/professional connections. I end up standing in front of multiple mirrors—one for my spouse, one for each of my children, one for my pastor, one for my boss, and so forth. It quickly spirals as I consider how I see them, how I see them seeing me, how I see them seeing me seeing them, and so on (dizzy yet?). Then I make decisions based on all of that input.

There are arguably some limitations to this theory, mainly due to the need to more deeply understand collective and social identity.[8] There are also many other personality and identity theories that have provided alternative explanations and models.[9] Notwithstanding those facts, there is some value in recognizing that part of how we see ourselves is tied to our perception of how we think others see us. Social media and 21st-century digital innovations seem to even further magnify this.

- How many email addresses should I have?
- Does each email address respond to some aspect of my personality I am trying to convey?

- Is it OK that my email address is quirky or does it need to be professional?
- Are my Twitter, Facebook, and Instagram posts professional or personal?
- Do I post the good and the bad in my life (e.g., full disclosure)?
- How exactly do I pose with a duck face?
- Will people think I'm lame if I still use a certain technology?

There is a related concept tied to the looking-glass self that Jean-Jacques Rousseau called *amour propre.*[10] The term refers to understanding a sense of one's worth. Like Cooley, Rousseau was interested in how we saw value and self-love in relation to others. Yasmin Ibrahim[11] uses Rousseau's amour propre to make the argument that today's digital culture is full of self-love through self-postings, self-representations, self-searches, and (of course) selfies.[12]

Both concepts tie together to frame the argument that we now have more ways than ever to examine our self-worth as judged by others with information we (or others) present to them. Digital technologies now act as another set of mirrors in the looking-glass self. This can be positive, leading to self-promotion and self-expression.[13] This can also be negative, leading to narcissism,[14] low self-esteem,[15] and self-comparison (potentially leading to depression[16]).

A second reason this lesson is important is because of agency. I am using agency to refer to action toward an intended goal. The examples provided in discussing the two concepts are all based on personal action. I create the email addresses, I decide what to post, and I decide what social media outlets to join. Based on these decisions, I can control the portrait I am painting for others to see.

There are multiple challenges to such an assumption. For instance, people don't always make good decisions. Once something is posted, it is catalogued forever. And there is more than just one agent in the equation. I can go out with friends who decide to take and post pictures (tagging me in them). My doctor can decide to create an electronic medical record that can be legally or illegally shared. Websites like the Whitepages[17] can decide to post where I live, my home phone number, and my approximate age.

I can choose what things I decide to post. I can also work on removing things that I do not personally approve of being online (with limited success). But the truth is that we live in an era where our information is online whether we want it to be or not.

This leads to a third reason this lesson is important. Many of the examples I have provided are presumptively from a personal perspective. In reality, that is how many people are currently using *or how they began* to use social media. There is a professional side to this conversation as well. Some people may decide to distinguish between social media tools; they lump Facebook and Instagram into the personal category and put Indeed and LinkedIn[18] into the professional group.

This can be positive for those who decide to create and maintain professional online identities. It is also positive for those who make sure that public postings to personal accounts are truly representative of the representation(s) they are trying to convey. This is not such good news for those who don't have professional online identities and are seeking employment.

NOW WHAT?

The lesson presented in this chapter suggests that digital innovations are changing how people see us and how we are able to represent ourselves. This is important because those same innovations are providing new ways for us to self-explore. It is

also important because those online representations are not just sole-authored; whether professional or personal, and whether we agree with everything posted or not, information about us is available online. That leads to three obvious implications.

First, protect and promote your personal identity. Here I recommend an exercise called *self-googling*, understanding the potential danger of this leading to aggravated narcissism[19] (you could also ask someone else to do this for you[20]). Go to a search engine, type in your name, and see what you find out. Are you happy with what you found? Are you happy with what you didn't find? Is there sensitive data in what you found? Are there ways to add privacy settings so that you can help control who gets access to your personal data?

Second, and related to the first implication, protect and promote your professional identity. This is a similar process and includes self-googling for the purpose of seeking information about your professionalism. If you were looking to hire someone, would you hire yourself based on what you found?

This is an area where many digital scientists, educators, and developers fail. In some cases, they are disadvantaged because there is a lack of professional information. This is problematic for any potential hire in the 21st century, particularly given the outlets available by which to showcase one's work and experience. I would argue that this is even more unfavorable for those working in the digital arena. It is hard to argue that you are experienced in the digital arena with no professional online identity (e.g., website, electronic portfolio, social media channel, etc.).

In other cases, career seekers are disadvantaged because there is so much negative personal information available. It would be unlikely that someone would want to hire them given what has been posted or shared. I understand the importance of the

freedom of speech, but you also have to appreciate the fact that people are looking for employees who know the right forums for self-expression (and the ability to discern between private and public forums).

A third and final implication is to keep your job. I suggested earlier that some people choose to differentiate between how they use social media for either professional or personal use. I understand the reasoning, but it is also important to note that the line between personal and professional online identities is very blurred.[21] This can impact whether you get a job and whether you keep it.[22]

There are numerous unfortunate stories of employees whose social media exploits cost them their jobs. A person serving as a mascot was fired after posting negative comments about the team he worked for.[23] A high school English teacher was forced to resign for posting pictures involving alcohol use on her Facebook account (she had friends who were students).[24] A Russian paramedic got fired for posting pictures of injured patients.[25] And don't forget about the Taco Bell employee who was let go for urinating on food and posting pictures of his exploits to Twitter.[26]

You may or may not agree with these outcomes (except in the case of the food), but it proves the point. Until the boundaries between personal and professional become more distinct (if ever), prudence is your best measure.

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LESSON 7

All My Facebook Friends Are Virtually Real or Really Virtual

> *SIR: I haven't got a computer, but I was told about Facebook and Twitter and I'm trying to make friends outside Facebook and Twitter while applying the same principles. Every day, I walk down the street and tell passers-by what I have eaten, how I feel, what I have done the night before and what I will do for the rest of the day. I give them pictures of my wife, my daughter, my dog and me gardening and on holiday, spending time by the pool. I also listen to their conversations, tell them I "like" them and give them my opinion on every subject that interests me . . . whether it interests them or not. And it works. I already have four people following me; two police officers, a social worker and a psychiatrist.*
>
> —Peter White, Derbyshire[1]

WHAT?

A number of interesting YouTube videos have been circulating for years that highlight technology adoption and its rapid growth (particularly as it relates to social media). These videos are often shown in keynote presentations, classrooms, or professional development meetings to fascinate and amaze listeners. They are updated each year and can be found by using keywords like *socialnomics* or *social media revolution* and then adding a year to the search. For instance, you can currently watch a video called "Socialnomics 2018"[2] or "Social Media Revolution 2017."[3]

If you watched these videos, you would be presented with information like the following:

- Most of today's college students have never licked a postage stamp.
- There are more Facebook and YouTube users than the population of any country.
- Social media is the major news outlet for two out of every three people.
- By 2020, video watching will account for 75% of all mobile data use.
- 2.3 billion people in the world are active social media users.
- 65% of Twitter users expect a response within 2 hours.
- 300 hours of video are uploaded to YouTube every minute.
- Social media advertising increases each year by 40%.

These are fun facts, although I use the word *facts* loosely. The authors of the pieces are not clear in how they get their data; many of the posts in the YouTube comments section about references and citations are left unanswered. There are also data that users post to counter some of the claims made in the videos.

Regardless of the accuracy of these numbers, they clearly demonstrate the reality that social media and digital technologies are growing exponentially. Such trends are backed by other sources like the Pew Research Center[4] in their reports on topics like social media,[5] job training,[6] and technology adoption by older adults.[7] The lesson for those interested in the relationship between society, culture, and technology is that digital tools and innovations are created, evolve, or disappear at an exponentially growing speed.

SO WHAT?

Digital scientists, educators, and developers need to appreciate the speed of technological change. This technology growth then acts as a catalyst for change in other areas like business,

education, and government.[8] There are at least two main reasons this lesson is important for those interested in the relationship between society, culture, and technology.

First, this rapid growth is recursive (chapter 1) and historical (chapter 2). This is not something recently discovered on YouTube channels in sole relationship to social media. Sometimes people will refer to this growth as Moore's law based on a paper written about integrated circuits by Gordon Moore.[9] Mack[10] summarizes Moore's law:[11]

> Underlying the electronics revolution has been a remarkable evolutionary trend called Moore's Law. Begun as a simple observation that the number of components integrated into a semiconductor circuit doubled each year for the first few years of the industry, Moore's Law has come to represent the amazing and seemingly inexhaustible capacity for exponential growth in electronics. . . . This observation of exponential growth in circuit density has proven to be one of the greatest examples of prescience (or [at] least trend spotting) in modern times.

Significant work has taken place in computer science, engineering, and other fields to test and critique Moore's claims.[12] Others prefer to cite Ray Kurzweil, who also acknowledges the rapid acceleration of technology growth and the limitations in Moore's law. In a chapter on nanoscience,[13] Kurzweil suggests the following about technology:[14]

> It goes beyond mere tool making; it is a process of creating ever more powerful technology using the tools from the previous round of innovation…The paradigm shift is currently doubling every decade. So, the twenty-first century will see about a thousand times greater technological change than its predecessor.

Regardless of the theorist, technology change is occurring rapidly and exponentially. A salient example is the evolution we have seen in what can be labeled Web 1.0, Web 2.0, and Web 3.0. The first iteration of the World Wide Web was relatively simple. It contained modest web pages with hyperlinks. Web 2.0

brought substantial changes to user interactivity, collaboration, social media, and global user development of content. The advent of Web 2.0 brought tools like blogs, vlogs, wikis, photo/video sharing, and social networking.

We are now somewhere in the adoption stage of Web 3.0 (theorists and practitioners disagree as to our actual location in adoption and whether we are pushing toward Web 4.0 or Web 5.0[15]). In short, Web 3.0 refers to the broader connection of information and technology via the Internet (sometimes called the semantic web[16]). This can include technologies like 3-D, virtual reality, and augmented reality. It can also refer to the Internet of Things, a term denoting the continual but advanced connection of network-enabled innovations ranging from smart homes and cities[17] to network-based appliances.[18]

A second reason this lesson is important is because it helps us to recognize that the rapid changes in digital innovations might mean that new tools are used in ways that may be unintended by their original developers. For instance, in the late 1990s, I had the pleasure of working with Sandra Crespo, a teacher educator (someone who trains current and future teachers). She had a large collection of videos that she was attempting to disseminate to her students. She wanted them to be able to highlight locations within the video that demonstrated their understanding of key topics.

As an educational technologist, I made grand plans to develop a web- and video-based delivery system. The tool would have multiple bells and whistles that provided innovative ways for teacher education students to select and comment on videos. I am *sure* it would have been *groundbreaking*.

Sandra, at the time, did not describe herself as a cutting-edge technologist. However, she was pragmatic and willing to explore new ideas and tools. She began by distributing DVDs of

classroom footage. Then, she found a way to use Microsoft Word and Apple QuickTime to copy and paste the movie clip start and stop times. It was literally as simple as selecting a video segment, hitting Copy, moving it into the Word document, and hitting Paste. The benefit was that students could then easily share their Word documents with each other over email (e.g., small word-processing documents vs. large movie files) without having to do any video editing. Anyone with the DVD could see the videos linked in the document. This all happened while I was still having delusions of grandeur for my latest invention.

Another more recent example comes from the area of video games and eSports. [19] eSports are defined as[20]

> a *form of sports where the primary aspects of the sport are facilitated by electronic systems; the input of players and teams as well as the output of the eSports system are mediated by human-computer interfaces*. In more practical terms, eSports commonly refer to competitive (pro and amateur) video gaming that is often coordinated by different leagues, ladders and tournaments, and where players customarily belong to teams or other "sporting" organizations who are sponsored by various business organizations. During recent years, eSports (electronic sports) have become one of the most rapidly growing forms of new media driven by the growing provenance of (online) games and online broadcasting technologies.

The growth in eSports has seen mirrored growth in live-streaming tools like Twitch (tools used to video and broadcast in real time).[21] I would wager that many developers and technologists saw the continued interest in and commercial viability of video games in both single and multiplayer formats. However, you would have a hard time convincing me that a majority of those same developers saw a future where people would watch other people play games, similar to how they watch college and professional sports. I personally would not have imagined living in an age where universities have high-priced

arenas for viewing electronic sports[22] or where eSports players have sometimes extravagant financial contracts.[23]

NOW WHAT?

This lesson suggests technology constantly changes in relationship to societal and cultural needs. That also changes what future technologies emerge and recursively creates new needs, problems, and opportunities. It raises an important question about how digital technology leaders can possibly stay informed and relevant. There are three implications for digital scientists, educators, and developers.

The first implication is to get connected. Many people are familiar with the game called Six Degrees of Kevin Bacon.[24] Someone gives a movie title or actor name, and the idea is that you can typically find a connection to the actor Kevin Bacon within six degrees of separation. For instance, if I know him, there is one degree of separation. If you know me and I know him, you are separated by two degrees.

Malcolm Gladwell penned a similar description of the importance of connection-making by describing the influential Lois Weisberg.[25] The simple but effective argument is that your degree of learning, influence, impact, and so forth, can be greatly improved based on the size of your network. For instance, you may not have ever been to Poland, but I taught in Poland. If you wanted to go to Poland, I know someone (that you probably don't know) who could help you.

One could argue this is the entire purpose of social networking tools like Facebook and LinkedIn. However, not everyone uses such tools for professional and personal growth. The title of this chapter could be turned into a variety of questions. *Who are your friends? Who is in your network? Who is virtually real that can support your technological needs and can help you stay on top of the ever-changing technology world? Do you use social media for professional*

growth and for keeping tabs on new tools and innovations that might positively or negatively impact your career?[26]

A second implication is to spend time reviewing software. This is admittedly a recommendation that is nearly impossible to fulfill. Our daily lives are so busy that there is little time for adding another task like downloading, installing, and exploring new tools. At the same time, there are so many new technologies being developed (seemingly by the minute) that choosing between the millions of available apps and software downloads becomes overwhelming. Both factors are a good reason it's important to use social media to get news about releases or to develop enhanced social networks to be introduced to new tools.

But that is not a replacement for actually spending time with new innovations. There are a number of clearinghouses and repositories that provide access to subject matter apps and tools. Cost also shouldn't be prohibitive. Many of these clearinghouses allow you to search for free, free-trial, and open-source software. Some have even been created to solely focus on open-source alternatives.[27] A part of the working life of the digital scientist needs to be devoted to staying in touch with technological changes through hands-on activities.

A third and final implication is to consistently be thinking about the future (see chapter 2 for looking backward). Understanding the recursive nature of digital technology implementation means that new tools will bring changes to societies and cultures. These societal and cultural changes will then bring new opportunities for the development and implementation of innovative technologies.

Thinking about the future does not (or should not) happen in a vacuum. Stimulus (getting new ideas) and response (talking with others about what you've learned) are critical components. One best practice for getting fodder for thinking about the future is

to spend time listening to or watching TED Talks. These talks, available freely online,[28] address issues ranging from musical instruments to teaching kids about computers and from cyber weapons to paying doctors for healthy patients. Most are short, thoughtful presentations that will help promote a deeper plan for asking, "What's next?"

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LESSON 8

I Was Like This In My Second Life

Jim: You playing that game again?

Dwight: Second Life[1] is not a game. It is a multi-user virtual environment. It doesn't have points or scores. It doesn't have winners or losers.

Jim: Oh, it has losers.

Dwight: I signed up for Second Life about a year ago. Back then my life was so great that I literally wanted a second one. In my second life, I was also a paper salesman, and I was also named Dwight. Absolutely everything was the same, except I could fly.

—Jim Halpert and Dwight Schrute in the television show *The Office*[2]

WHAT?

The relationship between technology, society, and culture is historical and recursive. It is one that results in both intended and unintended consequences to multiple aspects of our personal and professional lives. Sometimes those things are fun and easy to talk about or explore. For instance, it is great to use video conferencing to connect with people who live hundreds of miles away. It is really cool to put on virtual reality goggles and fly a drone. And video games can really enhance family togetherness (depending on what game is played!).

At other times, the issues and challenges raised by digital media are not fun or easy to discuss or address. This is particularly true when issues of equity and access are raised. *Is it fair that I have access to certain tools, and therefore certain knowledge, when others don't?* It can be extremely difficult to learn that some technological innovations have negatively impacted a race or gender.

For instance, women have been harassed when playing video games.[3] Fields like computer science have not always been inclusive of women[4] or minorities.[5] And virtual environments can lend themselves to racial discrimination.[6]

As I have shared repeatedly, that does not mean video games, computer science, and virtual environments need to be avoided. There are multiple examples in all three of those categories where positive gains have been made globally and in relation to issues of race and gender. The lesson for those interested in the relationship between society, culture, and technology is that digital innovations can positively or negatively impact race and gender issues.

SO WHAT?

Out of all the chapters in this book, the reasoning behind the importance of this lesson seems the most obvious. Digital scientists have an obligation in development and implementation to be inclusive. Period. There are three ways, however, that inclusion or exclusion may take place. These various aspects help support the justification of the importance of this issue.

First, digital innovations impact the digital divide. The digital divide is the difference between the haves and the have-nots. However, this does not solely apply to hardware and software access. Jan van Dijk and Kenneth Hacker[7] further expand the

concept to include four distinct barriers that exist between the haves and have-nots:[8]

1. Lack of elementary digital experience caused by lack of interest, computer anxiety, and unattractiveness of the new technology ("mental access").

2. No possession of computers and network connections ("material access").

3. Lack of digital skills caused by insufficient user-friendliness and inadequate education or social support ("skills access").

4. Lack of significant usage opportunities ("usage access").

Societal and cultural members who do not have mental, material, skills, or usage access are at a significant disadvantage from those who do have access. This problem becomes exponentially worse when content or other resources are only available through digital means. Take the example of a rebate for purchasing a new furnace. You can only apply for the rebate online; you have Internet access and I don't (mental or material). You now have access to additional resources because of your access.

Or take the example of schools that develop high-end technology classrooms. There are now thousands of free courses online. Teachers can offer these courses in whole or in part (combined in a blended setting). Compare that to a school that has limited technology access (again, regardless of where the deficit occurs along the four variations). It does not mean the second school with limited access has incompetent instructors. However, they are limited in access to content that might inform instruction.

Researchers sometimes call this *cultural capital*.[9] Over time, as if the digital divide wasn't bad enough, this capital can cause even greater expansion between those who have and those who do not. It is an example of a negative pattern within the relationship between society, culture, and technology. It can be addressed, but

it requires that digital scientists, educators, and developers have a deeper understanding of who has or does not have access.

A second reason this lesson is important is because technology can be used to demonstrate, advance, or make us aware of our hidden biases. Theoretically, digital innovations provide opportunities for heterogeneity and diversity. I could make a connection with anyone I wanted, regardless of their language, race, gender, or physical location. Unfortunately, research has provided evidence that the use of digital tools results in homogeneity (being of the same mind) and homophily (hanging out with people like ourselves).[10] Worse news is that our hidden biases also replicate themselves online; prejudices[11] and hostilities[12] can grow through technological interactions.

The news is not all bad. If technologies can be used to replicate our hidden or known biases, then those same technologies might be used to address those same issue. For instance, Ben Lok has been conducting research on the use of virtual humans for training medical personnel.[13] Traditional medical instruction has employed the use of a standardized patient (SP); an SP is an actor who pretends to have a medical condition so that doctors and nurses can practice skills like communication and diagnoses.

Lok's technology replicates the process but uses a virtual patient (VP), saving money and providing more hands-on practice for medical practitioners. The VPs can also be given medical conditions that SPs would not be able to necessarily imitate (e.g., eye movement from a brain tumor). More salient to this conversation, the technology behind the VPs allows the educators to replicate the same scenario multiple times with changes to a VP's age, race, or gender.

Lok and his team have demonstrated that doctors and nurses in training will treat virtual patients differently based on these characteristics.[14] However, the interactions are recorded. Those

same doctors and nurses can replay the interactions through the eyes of the virtual patient, presenting them with face-to-face evidence of their own actions. More recent iterations of the tool have even included eye-tracking to provide more concrete data.

NOW WHAT?

This lesson addresses complex issues of technology, race, and gender. It highlights the fact that digital innovators need to pay close attention to such issues in development and implementation. However, it also highlights how digital technologies can be used to explore such issues, to promote diverse experiences, and to potentially bring existing biases to light.

There are three implications for this work. First, digital scientists, educators, and developers should use digital tools as a medium to explore race and gender. One of the simplest ways to do this is to walk a mile in someone else's shoes.

When I teach students about these issues, I typically have them go into Second Life and create an avatar that they think represents themselves today (even if that is a salesman named Dwight). I ask them to match hair, clothes, body style, gender, and race as closely as possible. Then I ask them to explore various locations (islands) for 30 to 60 minutes, recording the types and frequencies of interactions.

I then ask them to keep their avatar as close as possible to the original with the exception of changing the race of the avatar. They then spend another 30 to 60 minutes engaging with others, noting similarities and differences in engagement and conversation. Finally, I ask them to repeat this exercise one additional time after having changed the gender of their character.

My students typically arrive at two conclusions. They begin to instantly recognize their own stereotypes in attempting to create a character that is a gender and race different from their real-life experiences. Most also share that they quickly recognize differences in how they are treated.

I could not instantly change my race or gender in a face-to-face environment. However, within seconds, I could do that in virtual environments like Second Life.[15] Chana Etengoff[16] notes the following:[17]

> Identity exploration within virtual space is particularly attractive as it is an anonymous process with limited physical world consequences and constraints. . . . In addition, social and educational scholars have found that young women are able to explore different femininities and gender identities within MMORPGs than they would be able to comfortably experiment within their offline worlds.

A second implication is that digital innovators need to be cautious in accepting or echoing racial and gender stereotypes when it comes to technology fields and experiences. It is true that there is evidence of biases and underrepresentation of minorities in females in areas like computer science.[18] That does not mean that those same populations are *absent* from said fields or have limited knowledge of any given technology.

For instance, there is a common perception that most gamers are men. Maeve Duggan corrects this assumption:[19]

> A majority of American adults (60%) believe that most people who play video games are men—a view that is shared by 57% of women who themselves play video games. But the data illustrates that in some ways this assumption is wrong: A nearly identical share of men and women report ever playing video games (50% of men and 48% of women). However, men are more than twice as likely as women to call themselves "gamers" (15% vs. 6%). And among those ages 18 to 29, 33% of men say the term "gamer" describes them well,

more than three times the proportion of young women (9%) who say the same.

Data can be used to demonstrate trends, agenda, biases, and stereotypes. Those findings then require deeper analyses and potential intervention.

A third and final implication is related to the idea of walking in someone else's shoes. My own unique, ironic, and somewhat comical intervention story relates to teaching a class in digital sciences. My course matched previously stated trends and enrolled mostly men. During the week we were discussing gender, the men in the group were in a lively discussion related to how women felt about gaming. It took me about ten minutes to settle the men down and help them realize they could stop hypothesizing and simply ask the women sitting in the class.

We don't often recognize that there are people around us who have varied and unique experiences and perspectives. In addition to making sure our network is broad (chapter 7), it must also be diverse. We already have a tendency to homogenize our interactions with and through technology; it will take directed effort to expand our horizons.

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LESSON 9

Some People Speak More Than One Language; Others Are American

Question: What do you call someone who speaks more than one language?

Answer: Bilingual.

Question: What do you call someone who speaks only one language?

Answer: American.

—Author unknown

WHAT?

I have had the joy of teaching and conducting research in multiple countries. I have learned significant amounts about myself, about others, and about technology through work in places like Italy, Spain, Poland, and Rwanda. In those various journeys, I have also met many Americans who not only spend their lives traveling the world, they can also converse with those they meet in the home language of the country being visited. As such, I am sure that the joke about Americans only knowing one language is offensive to someone (I have yet to see a joke in today's day and age that doesn't offend someone).

But there is some truth in all humor.[1] I use the joke here as an introduction to an unfortunate academic theme. There is a tendency for American educators, digital scientists, and

developers to be very country-centric. This may also occur in other countries (yes, I understand the irony of writing this lesson from an American perspective). However, there are many explanations as to why such a phenomenon thrives here. One reason is language barriers. For instance, there may be amazing things happening in China or Italy, but unless it is published in English practitioner or research journals and websites, many Americans will not have access to that knowledge.

There is a relatively short and important list of direct action items to address this concern—many of which are currently being undertaken by global education offices at universities or in curricular planning in K–12 settings in the United States. First, learn a foreign language. Second, travel the world. Third, enhance your global network (see chapter 7). Fourth, bring in students, faculty, and colleagues from foreign nations to positively impact local culture.

The obvious agenda behind these recommendations is a desired shift in thinking and action; the overarching goal is the willingness of educators, digital scientists, and developers to adopt a global perspective. And arguably the impetus behind such a shift is the fact that technology is helping create and support a global society.[2] Digital innovations give me a greater ability to engage with anyone from almost anywhere, even if I do not know their language or culture.

The only challenge with this approach is its hidden assumption. While technology does make global understanding possible, it does not mean it will happen or will happen without effort. There are success stories of K–12 and university partnerships between different countries using tools like Skype;[3] but not everyone capitalizes on this. Some very authentic foreign communities with live, native speakers have been created using tools like Second Life; although it allows opportunities for global

engagement, there hasn't necessarily been overwhelming adoption.

In sum, technology can help enhance or develop our global perspective.[4] This is critical to a number of important outcomes (e.g., dare I say *world peace*, understanding solutions that are relevant and timely, better technology development and implementation, promoting our expertise as educators, developers, digital scientists, etc.). However, this will not happen automatically. The lesson for those interested in the relationship between society, culture, and technology is that digital technologies open access to—but do not ensure usage of—global pathways.

SO WHAT?

The reasons this lesson is important seem obvious. As John Donne would say, no one is an island.[5] Depriving oneself of a global perspective seems both arrogant and ignorant. Adopting a global mind-set can scaffold growth and understanding. And given how technology is connecting people throughout the world, those serving in technology-related jobs should naturally want to capitalize on this opportunity.

Notwithstanding the obvious, it is worth addressing a specific explanation of why this mind shift is critical. It is related to important trends happening in our knowledge economy that impact our personal and professional growth. Kjell Nordström referred to this in his 2010 talk at the SAS Asia Pacific speaker series.[6] He noted that over time, we are growing smarter. We are, for the most part, smarter than the people that came before us (e.g., our ancestors). However, the amount of knowledge in the world is exponentially increasing. This is impacted, in part, by the adoption and proliferation of digital innovations and the amount of new knowledge being created each day. As such, the bad news is that although we are smarter than those who came

before us, we are technically a little *dumber* every day (in relation to the amount of knowledge available).

If we continue to work, learn, and play inside of our isolated environments, we are essentially depriving ourselves of access to knowledge and wisdom that continue to grow exponentially outside our sphere. One could argue, based on Nordström, that this issue is significantly more problematic for us than it was for our ancestors.

Seeking a global perspective could manifest itself in at least three variations. First, and perhaps most common, a developer, digital scientist, or educator could explore a specific topic of interest as it gets addressed or implemented globally. Take our previous example of K-12 virtual schooling in the United States. Someone interested in this area of study might begin by developing a deeper understanding of its history, current context, research, and best practice. That investigation and self-exploration would lead to some interesting and important realizations. For instance, K–12 virtual schooling often finds its usefulness in remote U.S. areas where schools have limited access to large numbers of students and cannot justify diverse and vast course offerings. Simply stated, a student in a small, rural school may not have an instructor available to teach a given course. K–12 virtual schooling affords new opportunities for such students and school districts.

The same investigator would then be able to compare that knowledge with K-12 virtual school integration in other countries. They would find that some countries (particular those that have fewer remote areas) have more access to local resources for instruction. After I gave an international talk, for instance, one attendee told me that U.S. virtual schooling would never work in his country on the justification of course offerings. Students who wanted a different course could simply access

multiple other school districts within a short bus ride (or an expert could easily bus to the school).

The investigator might also find other countries that have more remote areas with similar needs. However, some of those same countries have more limited technology access. Conceptually, bringing in a remote instructor with previously inaccessible content seems attractive. However, if schools do not have computers and/or Internet access, capitalizing on such an opportunity would be extremely difficult.

A second approach is focused on a specific country rather than a given technology. Instead of asking about implementation rates and variations of virtual schooling in Holland, someone could ask more broadly about existing digital innovations in that country. *What current digital innovations are popular in Holland?* Such a search might be more fruitful for individuals if tied with specific vocational, educational, or business interests. *What digital technologies are currently being utilized in schools in Holland? What technologies, if any, are used for enhancing and building smart cities in Holland? What digital tools are popular for business networking in Holland?*

A third type of investigation changes to focus more directly on a concept rather than a digital tool. A digital scientist could begin with a concept and see if, how, and when technologies and digital innovations support the idea. For instance, someone could explore the concept of collaboration. They could select a specific country (mirroring the second approach). They could also compare the concept across multiple countries (like the first approach). The idea, however, is to dig more deeply into the societal and cultural contexts that might then lead to explanations of past technological use or predictions about future digital implementation.

The first approach highlights taking a single technology and exploring it across multiple contexts. The obvious assumption is that people are—or should be—using that tool. The second method examines a country or context and more broadly explores digital innovations (potentially tied to vocational, educational, or business interests). The final approach attempts to remove preconceived notions about technology use and examines concepts in context. The goal would be to gain access to broader understandings of cultural and societal needs and differences that might emerge or be manifested in tools, innovations, and strategies. There are obvious variations and combinations of all approaches. The value, however, rests in digital innovators broadening and deepening their global understanding. It may help make us a little smarter each day.

NOW WHAT?

Digital technologies open access to—but do not ensure usage of—global pathways. This is an important lesson for educators, digital scientists, and developers because it reminds us all to diversify our understanding of both technology adoption and conceptualization of ideas. It encourages us to find out what others are thinking and how others are using (or not using) tools and strategies. In addition to traveling the world, engaging with global contacts, and perhaps learning a foreign language, there are four other specific implications.

The first implication is to guard oneself against arrogance. In *The World on Paper*, David Olson makes a fascinating set of arguments about how writing impacts cognition.[7] He explains that writing gave us the ability to be metacognitive and meta-analytic. After first being introduced to the book, I could not imagine someone reading it and finding fault with his logic. However, I then learned that there were those who used his arguments to look down upon cultures that were based in orality. Such a perspective ignored the ways in which oral societies use tools

like storytelling to preserve, remember, and pass on cultural and societal norms, histories, and customs.[8]

I would like to say this doesn't happen, but looking down at the have-nots happens more often than not. For instance, K–12 virtual schooling gained a strong foothold in the United States in the mid-1990s.[9] The United States continues to be a worldwide leader in terms of innovation and adoption. It would be easy to become comfortable and potentially overconfident in our existing approaches. However, there are other countries that utilize such tools in ways we are only beginning to adopt. For instance, in Singapore, schools have used technology days to practice learning opportunities at home. Compare that to my home in the Midwestern United States. We have had countless "snow days," where students sit at home without access to learning content during school cancellations. I know of very few schools in the U.S. that actually utilize online learning to counter these educational interruptions (compared to our international counterparts).

I also remember traveling to Rwanda to visit the schools. Yes, I did visit a school that had dirt floors and almost no access to digital learning innovations. But I also saw a school that would compete internationally in terms of technology availability, innovation adoption, and teacher professional development. The point of the implication is to drop all pretenses of a "holier than thou" mind-set to the comparison. There is value in looking at technologies or concepts across boundaries if the goal is to use societal and cultural roots to further understand current digital innovation use and potential. It must be accompanied with caution against dangerous judgments.

A second implication is to read more, something addressed in chapter 3 (and throughout this book). This suggestion flies in the face of the earlier admission that many articles have been written by foreign writers in their native languages. Developing

and nurturing a global network of collaborators can assist with this recommendation (see chapter 10). Following their publications and presentations will lend immediate insight into the kind of work happening globally. But, perhaps more immediately, there are free tools for translating almost any web page.[10]

This may begin with a search on Google Scholar.[11] It may also include using Google Translate to translate a word into a foreign language and then doing a search on that term. It could even include going to the website of departments and colleagues at foreign institutions to see research that is happening in their K–12 schools or universities. There is really no excuse for not at least attempting to expand one's horizon.

The third implication is to gain a deeper understanding of the technology readiness of countries. This may include a search for a specific country given the needs of a development team or a teacher who wants to connect classrooms. Or, this may simply be an exercise in understanding how to find out about the technology readiness of various societies, countries, and contexts. Some resources are very specific to the topic. For instance, those wanting to learn more about education often refer to the Programme for International Student Assessment (PISA)[12] or the Trends in International Mathematics in Science Study (TIMSS).[13]

Other resources are broader in nature and cover multiple topics. A great example is the reports available from the World Economic Forum.[14] They address topics like energy transition, cyber resilience, and global competitiveness. The World Economic Forum also produces the *Global Information Technology Report*.[15] By selecting any specific country, the report lists important network readiness factors like business and innovation environments, ability to effectively use ICT skills, and affordability of Internet and other technologies in the

country. A simple data report is not going to tell the complete story of the country or its multimodal distribution of resources. However, it will provide either an introductory exploration into a given country's resources or an initial comparison of topics across multiple countries. This could easily set the stage for a deeper research dive or a better planning discussion for commercial and nonprofit technology implementation.

Finally, there is arguably nothing that substitutes the experience of actually traveling to a foreign destination. Travel here means going beyond the major tourist cities and actually exploring the daily lives of residents of that country (consider if everyone living outside the United States imagined it was nothing but Hollywood and Disney World). Obviously not everyone has the luxury of participating in international travel. But we live in a global society. There are international students, teachers, and business colleagues surrounding our daily lives. We would be prudent to use that opportunity to learn more about how education, business, and development work in their countries. One of my Italian colleagues has reminded me that his country spends a significant amount of academic time on theoretical outcomes. His American experience has been more pragmatic in nature. We both agree that we have a lot to learn from each other.

Travel could also mean visiting through virtual environments. Language instructors have already adopted this method. They use everything from social media[16] to virtual reality environments[17] to connect native and nonnative speakers. Many gamers also know the privilege of getting to know those in other countries as they form partnerships and/or compete in multiplayer environments.[18] The idea is that if technology is flattening the world, then we can use that same technology even if we can't board a plane to accomplish our intercultural goals.

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LESSON 10

What Would Jesus Do?

Toto, I've a feeling we're not in Kansas anymore.

—Dorothy Gale in the film *The Wizard of Oz*[1]

WHAT?

The Wonderful Wizard of Oz is a beloved book by L. Frank Baum;[2] the musical film based on the book has been described as one of the most seen movies in history.[3] Dorothy Gale (the main character in Baum's book and in the movie) is knocked unconscious as a tornado pummels the Kansas home she shares with her aunt and uncle. She wakes up in the land of Oz and spends the remainder of the film doing anything she can to get back home. In the end, she comes to the oft-cited conclusion, "Oh, Auntie Em, there's no place like home."

I share Dorothy's sentiment every time I return from a conference, or even when I pull into my driveway from a relatively short trip to the office. Home brings joy through shared time with loved ones. As such, I would hesitate to suggest that sometimes too much of a good thing can be a bad thing. The truth, however, is that when it comes to our careers as educators, digital scientists, and developers, there is value in being able to move outside of our comfort zones or our home base.

This has been briefly addressed in chapter 9 with the advice of being willing to adopt a global perspective. However, the

recommendation here does not refer to a geographic position or a willingness to explore a concept currently being studied in a foreign culture, society, or language. It refers to the tendency to get stuck within one's field to the point of no longer being able to successfully implement fresh ideas. Someone can become so enculturated into their community of practice[4] that they begin to lose sight of anything other than what they know or what people around them repeat. Perhaps more importantly, they begin to lose insight.

This line of argumentation sounds like it is going to end with the recommendation to become a lifelong learner. A lifelong learner is someone who recognizes the need to always learn *and also* someone who does something about it (e.g., enrolling in a course or obtaining a mentor). There is some truth to such sage advice. The idea here, however, is more about what is being learned. The lesson for those interested in the relationship between society, culture, and technology is that digital innovations are best understood from an interdisciplinary perspective.

SO WHAT?

The reason this lesson is important is that to improve the chances of being successful, you should be willing to freely move in and outside of the discipline in which you are learning and/or working. I am not making an argument that someone should be an inch deep and a mile wide (or a jack of all trades and a master of none). There is definitive value in becoming a master of your trade and your training.

However, digital innovations are interdisciplinary by nature. Interdisciplinary is defined here as relating to more than one area of knowledge or study.[5] Consider a simple website. You may end up having a coder, a graphic artist, a designer, and a content developer all working together to finish a task. Being able to interact and engage with others (even if you don't serve in the

role or have competencies in those areas) is both a reality and a skill set desired by 21st-century employees.[6]

There are multiple examples (in my own work and in the industry) where adopting such a perspective has proven fruitful. The first example comes from a study I completed implementing digital tablets in an elementary school. The tablets were originally introduced to improve literacy outcomes; the study was specifically aimed at increasing reading and writing skills of students who had significant learning needs.

One particular student named Sarah was in a fourth-grade classroom but cognitively scored at first-grade reading and writing levels. She quickly became recognized as an early adopter of the new classroom tools. She was always one of the first students who asked to use the tablets or who tried out new features in the tablet software. By the time the study ended, her literacy scores were at or above grade level.

Left to its own accord, this brief snippet is a nice, tidy success story, particularly given the cognitive growth for a student that was labeled as educable mentally impaired (EMI). However, things get more complex if you dig deeper into the data. Sarah named her tablet Brian. She fed it daily using stamps that resembled food in the word-processing program. When her aunt was murdered at a party, she refused to use the tablet for a few days because she didn't want to tell Brian and make him cry. She was often found hugging the tablet.

I was left somewhat unscripted as a learning technologist. My goals were to improve learning using digital innovations. I did not know how to make sense of her actions in light of the positive learning growth. It was prudent to come up with an answer, because the teacher wanted us to replicate the study with every student we could find (hoping for the same learning

outcomes). But I would have had to have been blind to not recognize the uniqueness of her situation.

Enter the field of psychology and the work of the British developmental psychologist D. W. Winnicott. Winnicott proposed the idea of *transitional objects*.[7] A transitional object allows a user to navigate between their internal and external reality. Examples of transitional objects include dolls, blankets, and stuffed animals. Arguably none of those would have been allowed in the classroom. However, a tablet (a tool that the teacher was trying to implement) served as a great tool for Sarah to mediate the things that were happening at home or school with her internal reality.

I used this work to later argue for what I called a *deeper psychology of technology*.[8] The idea is that we need to borrow from multiple fields to be able to appropriately label and understand people's experiences with technology. The point here is that staying within a single field would have negated the opportunity to learn more about an appropriate concept that had been identified 30 years earlier.

Some might argue that instructional technology and psychology are innately tied; as such, this example doesn't serve as a connection between distant fields. There is an academic history to support such a claim (as well as theoretical connections). This continues today as technologists borrow from psychologists doing work in neurology.[9] But there are other more disparate interdisciplinary connections that could also serve as quality illustrations.

A second interdisciplinary example that fits this description comes from work in religious studies. An important tenet to almost any religious group is evangelism. Followers are asked to go and make disciples of every nation.[10] This is not a recent phenomenon; it is a practice that has lasted thousands of years.

Drawing on the historical and recursive aspects of the relationship between society, culture, and technology (chapters 1 and 2), it is also a practice that has involved a diverse collection of technologies.

For instance, religious games (digital and nonelectronic) have been used to reinforce learning concepts and to help users explore ethics and morality.[11] Engineers have supported flight-tracking systems for Bible delivery in remote locations, ranging from early radio use to digital data link systems.[12] Blogs, wikis, videos, chats, and other virtual environments[13] have been created for those who are not comfortable in a traditional church environment and for those that are homebound.[14]

And, perhaps most salient for this conversation, churches have been using distance learning[15] through correspondence courses for arguably hundreds of years.[16] Such courses can be high-tech, mirroring the offerings from some of the most advanced learning institutions. Others use email, audio translations, and even written mail exchange (e.g., in remote locations throughout the world).

The point is that religious groups have the experience of attempting to engage their current or potential parishioners through the earliest forms of the written word to the latest digital innovations of virtual and augmented learning environments. Imagine the potential lessons learned for anyone interested in digital science topics ranging from database design and implementation to video production and delivery. Many religious leaders have realized that new technologies represent exponentially greater returns on reaching audiences. As such, some have been early adopters and testers of this work. One does not have to agree with their theology to learn from their experience.

In sum, an interdisciplinary perspective can provide insight and information that will further enhance planning, development, and implementation. Examples illustrated ties between technology, religion, and psychology, but collaborative possibilities truly are limitless. For instance, educators,[17] security experts,[18] game developers,[19] and computer scientists[20] have all recognized the value in computer hacking—even given the public perception of the topic as threatening. Fashion and technology experts have collaborated to address social acceptability of *fashnology* wearables[21] and to create sweaters for children with autism.[22] And health, medicine, and digital scientists have partnered to create ingestible health technologies[23] and other mobile-based, health-monitoring tools.[24]

NOW WHAT?

Digital innovations can best be understood and implemented from an interdisciplinary perspective. Interdisciplinary[25] and collaborative engagement[26] are considered important skills for high school and postsecondary graduates. There are several implications for this lesson.

First, it is critical to read more research. Reading research was an implication of the measurement discussion of chapter 3. This expands that recommendation to include reading about work in other fields. An easy way to do this is to go to the subject index of the Directory of Open Access Journals (or some other journal search).[27] Find a journal that is suited to an area of interest and then do a search on the subject of interest (e.g., medical technologies).

This can be like finding a needle in a haystack. As such, to make this search more fruitful, a complementary second implication is to expand your network. This recommendation was the main focal point of chapter 7. Here, the implication is expanded to suggest a thorough examination of types of connections within

the network. There is limited use in having a network that consists solely of people that only do the same work as you. An interdisciplinary network would provide consistent introduction to ideas that might be novel in your discipline.

A third and final recommendation is to become a lifelong learner. This could include taking classes as addressed in chapter 3. More importantly, and to return to the discussion at the beginning of this chapter, this implication will require a change in perspective and an introspective examination of one's biases. Spending too much time in one's "home" (e.g., business, school, etc.) is not necessarily conducive to developing and maintaining an interdisciplinary perspective. This would also apply to spending too much time in theory without practical implementation and testing or having continual practice without theory and research backing the introduction of innovative tools. It is worth examining the backgrounds and current vocations of your circle of influence.

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CONCLUSION

The Wonder Years

Growing up happens in a heartbeat. One day you're in diapers;
next day you're gone. But the memories of childhood
stay with you for the long haul. I remember a place, a town,
a house like a lot of houses, a yard like a lot of other yards,
on a street like a lot of other streets. And the thing is,
after all these years, I still look back with wonder.

—Narrator in the television show *The Wonder Years*[1]

SUMMARY RECOMMENDATIONS

I wrote this book to share 10 lessons that will impact developers, digital scientists, and educators. In doing so, a major goal was to raise awareness of the value of understanding the relationship between society, culture, and technology. It is worth pausing here to summarize those lessons and the ensuing implications.

1. The relationship between society, technology, and culture is recursive. It is an important lesson because it can lead to effective decision-making, more accurate predictions, and pattern recognition. Digital scientists should use this lesson to personalize and customize innovations as well as to examine the personal nature of engaging with technology.
2. The relationship between society, technology, and culture is historical. It is an important lesson because we can examine past examples to inform future development and implementation. Digital scientists should use this lesson to

become better historians and more adept media consumers, and to have an improved ability to recognize historical referents.

3. The relationship between society, technology, and culture can and should be measured. It is an important lesson because responding to questions with data is a needed and required skill set. Digital scientists should use this lesson to read more research, to be able to define metrics, and to explore intended and unintended consequences of innovation implementation.
4. The relationship between society, technology, and culture is steeped with standards and definitions. It is an important lesson because definitions can engage or distance others; standards can help regulate and respond to ethical scenarios. Digital scientists should use this lesson to become more aware of ethics, standards, and terms in and outside of their given field of study or practice.
5. The relationship between society, technology, and culture brings new opportunities to engage with others. It is an important lesson because it helps us recognize that digital innovations scaffold the evolution of our relationships with others and with other technologies. Digital scientists should use this lesson to test their understanding of good and bad innovations, to examine their own relationships, and to discover new opportunities for communication and collaboration.
6. The relationship between society, technology, and culture produces innovations that change how others see us and how we see ourselves. It is an important lesson because these perceptions are created and adapted with and without our input. Digital scientists should use this lesson to protect and promote their personal and professional identities.
7. The relationship between society, technology, and culture results in rapid and exponential innovation creation and implementation. It is an important lesson because it

reminds us to examine what we really know, the audience we are really serving, and how others may use our developments. Digital scientists should use this lesson to get connected, to find new ways to review hardware and software, and to look to the future.

8. The relationship between society, technology, and culture can produce digital innovations that positively or negatively impact issues of race and gender. It is an important lesson as it helps us recognize agency in promoting or preventing the digital divide, can lead to the discovery of hidden biases, and can promote positive societal and cultural outcomes. Digital scientists should use this lesson to employ technologies for empathy and to challenge others about their hidden or overt agendas and biases.
9. The relationship between society, technology, and culture can open access to global pathways for learning, vocation, and relationship building. It is an important lesson because it does not happen automatically; it must be fostered through an examination of ideas, themes, and trends. Digital scientists should use this lesson to further develop a global mind-set by reading differently, examining global readiness, and developing international networks.
10. The relationship between society, technology, and culture is best understood from an interdisciplinary perspective. It is an important lesson because it opens up access to explanations and definitions from other fields, something that has been proven successful. Digital scientists should use this lesson to read more, to get connected, and to examine one's own internal biases and external networks of influence.

LESSON 11

Christmas is a significant religious celebration; it's not solely about giving or receiving gifts (or at least it shouldn't be according to Charlie Brown[2]). As such, I am going to sound like

a greedy, ungrateful, materialistic brat. But I am going to say it anyway: I really miss the Christmas mornings I had as a child. My sister and I would race down the stairs at some awful hour of the morning to see what new and exciting toys would be taking over the remainder of our school break.

Somewhere along the way, though, I started getting socks for Christmas. Don't get me wrong—they're really cool socks. And it's not all bad. Now that I am a father, I get to enjoy my kids with the same expressions on their faces that I had at their age. With maturity also comes the unfortunate realization that some people don't ever get to open up a pair of new socks.

I don't necessarily miss the gifts, but I do miss the days of wonder. Wondering what was in each box, wondering if I was going to get what I had asked for, and wondering what new things my parents found that I didn't even know existed.

I sometimes get nervous that we have lost the sense of wonder in informational technology and its related fields (e.g., digital sciences, development, education, etc.). I worry that we have replaced it with negativism, overwhelming critique, or a desire for extreme commercialism. Some will blame the peer-review process, others will point to the effect of standardized testing, and still others will call out big industry. But for whatever reason, we seem to be more quickly apt to strike down ideas and possibilities than we are to look at them with wonder.

I am not recommending we blindly adopt a utopian perspective that all technologies are going to lead to great outcomes. Rather, I am suggesting that we should be positively cautious when we engage with all the exciting, new innovations (that seem to be emerging faster than we can consume them). Call this an 11th lesson—free of charge. It is OK to be critical, where critical means a willingness to wildly explore with deserved reservation.

It is not OK to be critical to the point of losing the sense of wonder.

Calvin and Hobbes got it right.[3] It's a magical world where each day is full of possibilities (and wonder). Lesson 11: It's time to go exploring!

Notes

1.Brush, B. (Writer), & Dinner, M. (Director). (1993). Independence day [Television series episode]. In Brush, B. (Executive producer), *The wonder years*. Los Angeles, CA: 20th Television.

2.Schulz, C. M. (2017). *A Charlie Brown Christmas: Deluxe edition*. New York: Simon and Schuster.

3.Watterson, B. (2001). *Calvin and Hobbes: Sunday pages 1985–1995*. Kansas City: MO: Andrews McMeel Publishing.

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