FOREWORD BY
BRANDON HALL

SHOCK OF THE NEW

THE CHALLENGE AND PROMISE OF EMERGING TECHNOLOGY

CHAD UDELL AND
GARY WOODILL

FOREWORD BY
BRANDON HALL

SHOCK OF THE NEW

THE CHALLENGE AND PROMISE OF EMERGING TECHNOLOGY

CHAD UDELL AND
GARY WOODILL

22 21 20 19 1 2 3 4 5

ATD Press is an internationally renowned source of insightful and practical information on talent development, training, and professional development.

ATD Press
1640 King Street
Alexandria, VA 22314 USA

Ordering information: Books published by ATD Press can be purchased by visiting ATD's website at www.td.org/books or by calling 800.628.2783 or 703.683.8100.

Library of Congress Control Number: 2019933796

ISBN-10: 1-947308-80-7
ISBN-13: 978-1-947308-80-0
e-ISBN: 978-1-947308-81-7

ATD Press Editorial Staff
Director: Kristine Luecker
Manager: Melissa Jones
Community of Practice Manager, Management: Ryan Changcoco
Developmental Editor: Kathryn Stafford
Text Design: Michelle Jose and Shirley E.M. Raybuck
Cover Design: Faceout Studio, Spencer Fuller

Printed by Versa Press, East Peoria, IL

CONTENTS

FOREWORD

If you're involved with technology for learning and development, you're facing ever-increasing challenges with the selection and use of technology. This book will give you a multiyear look-ahead of the massive innovations and cool tools you may be asked to learn about and implement over the next five to 10 years.

Here's the thing: Every few months, technology becomes more complex, more interconnected, and more embedded in your organization's internal systems. The BUILDS framework presented here will provide you with a broad perspective you can use to evaluate the predicted as well as the largely unforeseen consequences of a new technology for your organization. You will learn to be a systems thinker; someone who is able to watch out for the concerns of the enterprise as well as those of individual learners—before unintended consequences appear.

How did you first get involved with technology for learning and talent?

I don't know your route, but I'll tell you mine. In the early 1980s, stories about Steve Jobs and the personal computer captured everyone's attention. A cultural shift was happening and I wanted to be part of it. It was time to "Go West, young man," so I picked up and moved to Silicon Valley. I soon bought my first computer, an Apple II. Oh, and then I bought $3,000 of stock in a little-known company named Intel. More on that later.

Besides my early connection with technology, I want you to know what I learned in my first Silicon Valley job with Wilson Learning Corporation. The company's founder, Larry Wilson, was a great teacher and futurist,

and he espoused beliefs that were very much related to the book you are holding. He got many of his ideas from another powerful source of the day: Alvin Toffler's *Future Shock*. As a reminder, future shock is what happens when change is coming so fast that people are left confused and stressed, and normal decision making is no longer sufficient to deal with the complexities presented. Sound familiar?

That last part is key: normal decision making is no longer sufficient to deal with the complexities presented. And that's the focus of this book. *Shock of the New* provides a framework for you to use to be mindful of the known and unknown implications—the unintended consequences—of new technology in your organization. This framework will help you become aware of more of the issues, make better decisions, and reduce your organization's future shock, the shock of the new.

I am not aware of any other resources that will guide you in keeping the broader issues of technology selection in mind. You'll find a 30-question scoring system for evaluating the selection of new technologies, which has been organized into six categories. The categories make up the authors' BUILDS framework. You'll then see this framework applied to six different emerging learning technologies, revealing the implications of technologies you'll likely be dealing with soon.

It turns out that every new technology has far-reaching and often novel implications. The BUILDS framework uncovers an entire landscape of these implications and impacts that result from the technology choices you and your colleagues make today and will make tomorrow. It is to your advantage to look at these potential impacts from the broadest possible perspective. You need a way to see the bigger picture, and to be aware of unanticipated outcomes.

My friend and trusted colleague Gary Woodill and his co-author Chad Udell know more about current and future learning and development technologies than anyone else I know. Few people are as tech-savvy, future-aware, and broadly informed as Gary. He has the academic research rigor and persistence to gather all the relevant information to help you understand the topic at hand. His primary objective, for as long as I have known him, is to stay abreast of all the current and emerging trends in technology

for learning. He is a technology futurist, and research-based at that. He knows what he is talking about.

Chad is cut from similar cloth. He's unique in combining experience and training in design with one of the most innovative minds in technology. He's truly on the leading edge of technology development, and deeply understands innovative software. As a side project, Chad designed and led a team to develop a smartphone app for people with visual impairments using computer vision, in a project funded by Google. He knows the future of technology and is developing learning apps using both augmented reality and virtual reality.

Future shock is not going away. Not only are bigger changes coming, but the rate, breadth, and magnitude of change is accelerating. And there's no end in sight. There's no future predicted for our lifetime where innovation will slow down and we'll have a chance to get caught up, sort it all out, and fix all the problems. So, use the information in this book to help you and your organization deal with what is coming at you.

To bring this full circle, I spoke earlier of Steve Jobs. As you may know, Jobs started playing with computers while he was still in high school, where he met Steve Wozniak. Until a few years ago, I lived across the street from the house where Steve Wozniak grew up and where he tinkered with circuit boards in his garage. That house is gone, and Steve Jobs has passed on, leaving his mark. Today each of us carries the world's knowledge in our pocket and life will never be the same for any of us, or our children.

Change continues. By the way, I sold that Intel stock after only a year. Today, as near as I can tell, it would be worth somewhere north of $10 million. (Sigh.)

You are one of the influencers for the best use of technology in your organization. Best of luck as you help reduce the shock of the new.

Brandon Hall, PhD
Executive Coach
Founder, Brandon Hall Group

PREFACE

Today, we all are immersed in the flow of nonstop technological change. But, as the currents of change sweep around, over, and by us, we may be so caught up in efforts to keep up with the next new thing, we're hardly aware of how much change has actually happened just during our lifetimes.

The two of us have been collaborating on new technologies and thinking about their meaning for nearly a decade, yet our paths to this common point could not have been more different.

For Gary, an awareness that a shift from an analog to a digital world was under way dawned in 1966 with his first part-time, post–high school job—shelving and checking out books at the York University Library in Toronto, Canada. In the back of each book was a card full of little rectangular holes. To check a book in or out, you stuck the card into a machine that read the information and sent a message to the mainframe computer housed in the basement of the library. The rest was a mystery.

The possibility that computers could be used as teaching tools occurred to Gary in 1974 when his graduate school supervisor at Memorial University in St. John's, Newfoundland and Labrador, Canada, invited him to attend a demonstration of the PLATO computer-based learning system, running on the university's mainframe computer, which was located somewhere on campus (but who knew where?). This led to an interest in building educational content for the Telidon videotext trials at TVOntario in Toronto, and using something called a "personal computer," a Commo-

dore PET, housed in the library of the college where he was teaching. When he started his doctorate in education in 1980 at the University of Toronto, Gary took his first programming courses, and over the next four-year period witnessed the introduction of email on a VAX minicomputer, and the arrival of the Apple II, the MacIntosh LISA, and the IBM PC Junior microcomputers, all used in educational computing contexts.

In 1983 he was surprised and impressed to learn that his new friend, Karen Anderson, had a terminal in her apartment hooked up to the university's VAX computer using an acoustic modem. It was love at first sight, and they were married a year later. They acquired their first computer shortly after—a 26-pound metal-encased Kaypro II running the CPM operating system. A year later, they replaced the Kaypro with one of the first laptops in the world—a Radio Shack Model 100, with 24 Kb of memory. There was a real sense at the time that everything was on the cusp of immense change, brought about by the advent of personal computers, but no one really knew just how much change would happen over the next 35 years.

Meanwhile, young Chad was in first grade and nurturing a love of technology of his own. From the Christmas that brought an Atari 2600 and a few games to the school computer cart (yes, one computer for an entire school!) with the Apple II, Chad was immersed in understanding how games and programming worked. By the age of eight, he signed up for a summer program to learn Basic. He ended up teaching his teachers how to program Logo and write simple text-based applications. As he grew and his love of technology, creativity, and art also grew, he taught himself Illustrator and Photoshop, and then Hypercard, inspired by the now classic 3-D adventure game Myst. He also introduced desktop publishing to the yearbook at his high school.

After going on to Bradley University, spending his nights hacking his PowerMac 7100/66 with ResEdit, and building his first websites for Mosaic in 1995 with SimpleText and GifBuilder, Chad was hooked! He simply had to continue the journey of melding design and the latest technology. After graduation, he got a job designing music websites in Chicago and built Flash games, skins for mp3 players, and lots of other fun digital bits—always at the cutting edge of the web, digital design, and high-tech. Soon,

his evenings and weekends were filled with teaching classes on the tools of the trade. He loved sharing his knowledge with others just starting their own journeys.

Later, Chad joined a digital agency closer to his college home and began working on innovative interactive installations featuring gestural controls, Wi-Fi controlled robots, and lots of interactive rich-media and mashups. His exploration of mobile devices started around this time, too, captivating his imagination and pointing to the possibilities of a new age of the untethered computer, one more powerful than its predecessors due to its unique capabilities. He joined his alma mater's interactive media department as an adjunct instructor, lending his expertise to the next generation of technical designers and developers.

In 2010, Chad co-founded Float Mobile Learning, a custom software development company in Morton, Illinois. Float has been an innovator, winning awards for its app design and development, research in xAPI, and groundbreaking work in augmented reality and computer vision. At industry events, the Float team would both showcase their work and help others learn about emerging technologies.

In this new venture, Chad and the team scoured the web looking for new talent to join their team. After Chad reviewed Gary's 2010 book, *The Mobile Learning Edge,* he invited him to join an event Float was planning—a symposium on mobile learning at Bradley University. Gary and Chad hit it off instantly. The bond? New and emerging technology, of course!

We've been working together ever since—on three book projects, including this one, blogs, whitepapers, and conference presentations for Float. Our clients have kept us on the leading edge of change for the past decade. Clients demand innovation to create competitive advantages using the latest technologies. But, as we've learned, achieving a competitive advantage for our clients is not as simple as just using the latest technologies. Every innovation must be assessed in the context of each client's situation, and the pros and cons of the affordances of the new technology.

This book is our effort to raise awareness of technological changes that may be coming your way, to give you the tools to assess emerging learning

technologies and their relevance to your enterprise. It's the culmination of our collaboration—and it wouldn't have been possible without countless conversations at conferences, online in our personal learning networks, and, of course, in our close relationships with our co-workers and colleagues. On behalf of both of us, please enjoy *Shock of the New.*

Chad Udell and Gary Woodill
Metamora, Illinois, and
Belleville, Ontario
April 2019

INTRODUCTION

There have been so many new learning technologies over the past decade, it tends to make your head spin. Each year we are confronted by the latest and greatest technologies at conference sessions, in keynotes, and in industry publications. Given that the pace of change is accelerating, how do talent development and learning professionals keep up with what is new? How do we judge what is important for our organizations? How will we know something is not just a fad but will change the way the world works forever? How can we plan for the near future in a world of constant change?

Learning is still critical for companies to remain competitive, to keep up with innovation, and to win in the world of business. This means learning leaders need to ditch old ideas of being mostly experts and sources of information for the more exciting challenges of guiding individuals and teams into a "new normal" that uses technologies to support the company, helps build relevant collective shared knowledge and a "learning culture," and reignites enthusiasm for accomplishing goals that meet real human needs. To do this, learning professionals need to understand the workings and implications of the new technologies, recognizing that workplace learning is critically different than classroom-based learning and is just as important as any other function of a business. Many varieties of learning are going to be called for, from memorization of mission-critical safety and security protocols to experiences with vision-busting simulations in virtual reality, and everything in between.

Emerging technologies are those that have already been invented but are not well known or widely distributed. They are defined as technologies "currently being developed and holding a realistic potential to not only become reality, but to become socially and economically relevant within the foreseeable future" (Stahl, Timmermans, and Flick 2017). Emerging technologies are often unpredictable, changing things in ways we could not have foreseen. As for relevancy in the next five years for learning and development, some of the most commonly discussed emerging technologies include 3-D printing, artificial intelligence (AI), augmented reality (AR), big data and analytics, cloud computing, the Internet of Things (IoT), mobile learning, personalization algorithms, robotics, virtual reality (VR), and wearables. Other information and communications technologies (ICT) that are emerging over a 10- to 20-year timeframe and will likely impact learning in the longer term include affective computing, ambient intelligence, bioelectronics, a redesigned Internet, human-machine symbiosis, neuroelectronics, and quantum computing.

To say that we are living through a period of rapid change is already a cliché. The reaction to the new will be different for each individual, depending on the impact of the change on one's life, one's tolerance for change, and one's ability to cope. Many of us welcome change and new technologies, and thrive in the novelty and wonder of what is coming next. Others experience turmoil, loss of jobs, precarious work, and a feeling of being overwhelmed with the requirements of managing all the new technologies that show up each year. Learning professionals are no different than anyone else; they will have a variety of reactions to the disruptive times we are going through.

When we began our research, we assumed that learning technology evaluation frameworks or rubrics that we could work from already existed. But after an extensive search, we found none that could actually assist us in evaluating recent emerging learning technologies for the workplace. The few evaluation frameworks that were available were well over 10 years old, making their examples almost irrelevant in terms of today's technologies (for example, Oliver 1998). Consider that 10 years ago the iPhone had just been invented, augmented reality was largely confined to lab environ-

ments, and the iPad simply did not exist. (However, we did find some of the evaluation criteria in these frameworks were still useful—for example, Geisler 1999).

While we were able to locate many examples of evaluation frameworks for *educational* technologies (Heinecke et al. 1999; Oliver 2000; Johnston and Barker 2002; Noeth and Volkov 2004; Ozkan and McKenzie 2006; Calinger and Howard 2008; Lee and Cherner 2015), we felt that they were not representative of trends and contextual variables in non-educational organizations, such as companies, the military, governments, or the nonprofit sector (collectively referred to as *enterprise* learning). As we argue later, the evaluation of learning technologies for workplaces has to be quite different than for school or university-based classrooms.

That said, we were unable to find an evaluation approach that both reflected the realities of changing workplaces and considered all the new technologies that have arrived since 2000. A few writers focused on evaluation frameworks for specific technologies and workplace learning (such as Ramstad's [2009] "developmental framework for innovation and learning networks" and Hsu and Ching's [2015] review of "models and frameworks for designing mobile learning"), but there is no overall framework for the evaluation of emerging learning technologies. Perhaps the closest attempt to develop a framework for the evaluation of emerging enterprise learning technologies is the one based on the business-oriented Balanced Scorecard (BSC) approach developed at Tehran University in Iran (Kaplan and Norton 1992). "E-learning BSC contains four original perspectives: (1) financial perspective (2) e-learner perspective (3) internal process perspective (4) learning and growth perspective" (Momeni et al. 2013). While we find these four perspectives supportive of our thinking, they don't go far enough.

Welcome to the BUILDS Framework

So, we developed our own framework, with lots of help from the research and writing of others in the enterprise learning field. Our work has been a genuine collaborative effort, with weekly phone calls; sharing of articles,

journals, and books; exchanges of many drafts; and the melding of more than 60 years' combined experience in the field of learning. In this age of complexity, collaboration is the only way to overcome the "ingenuity gap" that humans now face (Homer-Dixon 2000).

We particularly wanted to take a broader view of evaluating learning technologies, one that went beyond "the workplace" to include the wider world. This was important to us because we are now living in a highly connected networked society, and the technologies we use have larger implications for our society as a whole.

In thinking about the evaluation of learning technologies, we worked and reworked different ways to critically describe the current and emerging situation in enterprises in Western societies. We recognize that while we are both technophiles with biases for the use of technologies (rather than seeing them as inherently dangerous), critics of technology are out there. We take their concerns seriously and address the fact that all technologies have bright and dark sides (Holland and Bardoel 2016; Foer 2017).

For our framework, we've picked six evaluative perspectives:

- Business
- User experiences
- Impact
- Learning
- Dependencies
- Signals.

The first letter of each of these six perspectives form the acronym BUILDS, which adds a positive spin (as we noted, we do have a bias in favor of technology!). To apply the framework, we've created a rubric of 30 questions—five per perspective—that you should consider when evaluating any emerging learning technology.

While we recognize we could be missing something or have failed to recognize an implication of adopting a technology that may show up in the next few years, that's the nature of the emergence of "complex adaptive systems" (Holland 2012). As such, changes in enterprises and learning technologies are inherently unpredictable. At best, we can map out likely scenarios for the next five to 10 years. Beyond that, all bets are off.

About This Book

Our purpose in *Shock of the New* is to both offer answers to some of the questions we posed at the beginning of this introduction and to provide you, as learning and talent development professionals, a framework for making judgments about the importance of emerging technologies that can affect you and your organization.

In chapter 1, "The Digital Transformation of Enterprise Learning," we look at the last 20 years of disruption within the learning and talent development field, caused by the introduction of digital technologies. We outline what is driving the growth of digital technologies, especially those that are important for the learning and talent development industry. But, we also caution against the idea that disruption is *automatically* happening within specific industries. While disruption theory suggests that the old collapses and the new takes over, this is often not the case (Christensen, Raynor, and McDonald 2015). There are both incremental changes and disruptive changes happening at any given time in all industries.

Whenever change happens within an industry, it engenders a feeling of turmoil. But eventually things level out and we experience a "new normal"—a pattern known in evolutionary theory as "punctuated equilibrium," borrowed from evolutionary biology where bursts of change and abrupt speciation are interjected between relatively stable periods of stasis. The same concept can be applied to technology as well, where many devices, services, and other products emerge abruptly, followed by some level of percolating calm.

In addition, not all technologies are successful or useful, or capable of sustained success (Cochrane 2012). There are numerous examples where a specific technology has been hyped and investments made and some growth occurred, only to recede and disappear a few years later. A good example is the growth and decline of the simulation platform Second Life as an educational environment (Mark 2014). While it had 5.5 million users in 2016, that had dropped to less than half a million users a year later. We don't know anyone in the learning and talent development industries who is still on the platform, which is now described as a "digital ghost town,"

with residents and businesses "fleeing for more popular social networks long ago" (Veix 2018).

How can we know if this is likely to happen to other technologies? And, even if a technology grows and thrives, is it the right technology for you as a learning professional? Will it help you accomplish your mission in your organization? It's important we get a realistic view of what the new normal is likely to be so we can be prepared for it.

The heart of the book, chapters 2 to 7, presents the six perspectives of our BUILDS framework for evaluating emerging learning technologies. Chapter 2, "Business Needs for Learning Technologies," shows how to evaluate a technology's impact on your business's bottom line. Learning and development departments can sometimes overlook this key area of technology assessment by placing a premium on learning; business stakeholders, on the other hand, have no difficulty placing a premium on bottom-line numbers. If impact on the bottom line is not the first consideration, it may be hard to get funding for the implementation of any new technology.

In chapter 3, "User Experiences of Learning Technologies," we explain how to evaluate technologies in terms of end user experience (UX) and identify their key affordances. There are many ways to design the implementation of any technology, as each new technology has a set of "affordances" or features that allow something to be done with that technology. Indeed, understanding the value of the design to the user by uncovering the users' true needs and goals is vital to determining if a new technology is worth using in your business.

When it is introduced to the world, every technology has both intended and unintended consequences. Chapter 4, "The Wider Impacts of Learning Technologies," describes a new technology's three levels of impact—the micro-level impact on individuals and small teams, the meso-level or organizational impact, and the macro-level impact at regional, national, and global levels. We briefly look at how to evaluate the impact of emerging learning technologies for individuals, organizations, and the planet to remind us that we are all interconnected. Learning usually takes place within a "complex adaptive system" (Holland 2012), which includes a designated learning environment as well as networked connections for all

employees. Learning and talent development is only one part of the functioning of any organization, but we need to play our part in making each enterprise sustainable in the future.

One of the main purposes of any learning technology is to facilitate learning. However, as we'll see in chapter 5, "Learning With Emerging Technologies," there are many different types of learning, and some technologies better support one type over another. For the purposes of discussion in this book, we emphasize workplace learning over learning that takes place in educational settings such as schools and universities. This is an important distinction, as we all have grown up in an educational system and tend to have a bias toward its methods of teaching and assessment.

In chapter 6, "Dependencies of Learning Technologies," we discuss those aspects of the environment and other technologies that need to be in place to have a successful implementation of a learning technology. Dependencies can range from having proper policies in place to receiving support from upper echelon executives or key employees, getting impeccable security, and ensuring that the right infrastructure, hardware, and software are available to company employees. There is a dark side to dependencies as well, due to the secondary definition of the word, which we also cover. Dependency is often a topic that is ignored or neglected when evaluating new learning technologies.

Chapter 7, "Signals of the Future," examines the final category of the BUILDS framework—those signs of where a technology is going next and what to expect in the near future. Here we take a five- to 10-year perspective because it is almost impossible to predict the state of technology and the world beyond that. At the same time, we recognize most of the technology that's coming within the next five years has already been started somewhere in the world, either as a proposal or a prototype. Here we reveal our sources and methods for predicting the (near) future of emerging learning technologies.

In Chapter 8, "Crafting Strategies for Emerging Learning Technologies," we look at what is needed to manage the changes that are inevitable when new technologies are introduced into an organization. How will a new technology affect jobs and the organization chart? Does your group

have a change management strategy in place? If not, this chapter points the way to developing such a strategy. Given that emerging digital technologies are usually disruptive and can leave the executives and staff of an enterprise behind, what are the skill sets necessary for successful learning and talent managers in the digital age? What is digital literacy for a corporate or government talent development leader?

In addition to a glossary, the appendix features the BUILDS framework in its entirety, along with six samples of the framework applied to specific emerging technologies.

We see this as an optimistic book. While it is true that your roles as learning and talent development professionals are rapidly changing, you can look forward to important new missions in the evaluation, selection, implementation, and operation of a host of new learning technologies. In reading and using the guidelines and suggestions we make, we hope that you will gain a new perspective on what is coming next, and what you can do to get ready for the changes on the horizon. Most of all, we hope that you find *Shock of the New* useful, both at the higher-order levels of help in planning, strategy, and change management, and at the day-to-day level facing the challenges of implementing a specific learning technology in your workplace, wherever it may be.