IMMERSIVE LEARNING
Designing for Authentic Practice
Koreen Olbrish Pagano
“Koreen’s experience, knowledge, and insight in designing, building, and creating immersive learning environments shine through in this work through impactful storytelling and wonderful metaphors. She provides vivid case studies, conversational explanations, and enough encouragement to convince you that immersive learning is not only the correct instructional approach, but also that you can and should get started immediately.”

—Karl M. Kapp
Professor of Instructional Technology, Bloomsburg University
Author of The Gamification of Learning and Instruction

“Immersive Learning is the first book to take the notion of learning experience, flesh it out, and map it to new technologies such as virtual worlds and augmented reality games. Illustrated with illuminating examples and insightful heuristics, this book provides a practical road map to designing and developing such experiences. Mixing good learning principles, engaging design concepts, and hard-won lessons, Koreen Olbrish Pagano has laid out a compelling and practical guide to the future of learning.”

—Clark Quinn
Author of Designing mLearning: Tapping Into the Mobile Revolution for Organizational Performance

“The American theoretical physicist Richard Feynman once said, ‘What I cannot create, I cannot understand.’ Creation is a common theme in Immersive Learning: creating practice opportunities, creating emotional connections, creating learning environments, and creating productive interactions. While recognizing the role of technology to reduce uncertainty in goal-driven activities, this book never loses sight of what makes learning genuinely (and personally) rewarding: a sense of fun and wonderment on the part of the student. The author’s evident enthusiasm for her subject matter leaps from these pages. She cites numerous case studies in both evidence-based and incentive-based learning, providing readers the tools they need to endorse their application to any learning context.”

—Kel Smith
Principal of Anikto LLC
Author of Digital Outcasts

“Immersive Learning is a manifesto for the future of learning design. It emphasizes the need to do instructional design differently to change the nature of learning design’s impact on the organization. The case studies provide concrete examples to show that it can be done with phenomenal results. Read Immersive Learning and begin using designed practice to turn your content into behavior change.”

—Andy Petroski
Director and Assistant Professor of Learning Technologies
Harrisburg University of Science & Technology
DEDICATION

For my kiddos—Clarisse, Elvis, Jackson, Vardan, Sallie Rose, and Zevon—who immerse me in learning every day, and for my mom, who always told me I could be anything I wanted to be.
INTRODUCTION

In my favorite *South Park* episode, there is a mysterious problem: All of the boys’ underpants are being stolen every night. The parents are angry; they can’t understand why all of their children’s underpants are disappearing.

The boys stay up one night to try to catch the underpants thieves, and discover that the culprits are gnomes. Following the gnomes (who are carrying more stolen underpants) through a hole in the wall and into their underground cavern, they find enormous rooms, full of all of the kids’ underpants that they had been stealing.

The boys confront the gnomes, and ask why they are stealing the underpants. The gnomes explain:

**WHY GNOMES COLLECT UNDERPANTS**

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The problem is, of course, what is "Phase 2"?

We have the same problem with learning. We collect information—aka content—and provide it to learners. Then we make the mysterious leap to Phase 3: in our case, behavior change.
Does it work? Does providing information to learners lead to improved performance and behavior change? Sometimes, maybe yes. Often, probably not. Just because I know something doesn’t mean I can do it. I know how other people ride a skateboard; I can’t do it myself. I’ve watched great web developers create amazing interactive experiences, but I don’t have the expertise to model that even if I can see the source code. What would give me the skills to improve my performance? Practice. How do we create practice opportunities? We design them.

Phase 2 for learning professionals is designed practice. Some people may have answered the Phase 2 question differently; they may have proposed technology as the mysterious Phase 2, as if technology is somehow the magical conduit of content, the bridge from content presentation that leads to behavior change. When I’m asked to present on the future of learning technology, or on emerging technology trends, I always come back to the same argument: The future of learning technology has very
little to do with the technologies. Technology is a tool, an enabler, a facilitator of achievements—but it is just a tool. It is how you use the tool that makes it effective. Design is what differentiates our experience; it makes things easier to use, more meaningful, more efficient, and more fun. Design leveraging technology helps facilitate your goals, but it is not the technology itself that creates the experience. Technology creates opportunities; design activates them.

The future of technology-enabled learning is mobile, augmented, visual, location-based, kinetic, and story-line driven. The future of technology-enabled learning is immersive. Immersive in the sense that I am “in” the learning experience and I am practicing doing the things that I need to do better. I am making decisions. I am leading a team. I am operating a medical device. I am interviewing for a job. I’m practicing and I’m getting real-time feedback and I’m getting better. Technology allows that to happen anytime, anywhere.

**HOW PEOPLE ARE LEARNING**

If you see people playing *Angry Birds*, they are practicing physics.

If you see people playing *World of Warcraft*, they are practicing strategic planning, team building, and leadership skills.

Graphics courtesy of Shutterstock.
The real question is: Why are we not leveraging these types of environments for targeted learning goals?

Game designers know more about cognitive science and motivation theory than most learning professionals. Think about it. They have to design experiences that are not so hard that players get frustrated, and not so easy that players get bored. They have to create enough curiosity, appeal, or emotional connection in the game so that players will want to play the game over and over, improving incrementally as they play, for hours and hours until the player has mastered the skills required to beat the game. They have to appeal to a large—preferably diverse—audience. These games need to be so appealing that people will pay to play them in their free time, choosing to play a game over any other activity.

Have you ever seen classroom training or an e-learning course that was so well-designed people would pay to take it in their free time for fun? I’m guessing most of you would say no. If you said yes, what was it about the course that made it engaging and meaningful?

**WHAT CAN ORGANIZATIONS LEARN FROM GAMES?**

Organizations are starting to learn from the entertainment industry. Learning should be meaningful, but it also can—and should—be fun. People who are more engaged in their learning experiences are more likely to stick with them. People who forge an emotional connection to characters and decisions in a story line are more likely to remember them. Plus, people learn from their mistakes (University of Exeter, 2007).
Organizations have a constant need for employees, students, or members to continue to learn and develop new skills to stay competitive in an ever-changing marketplace. Providing employees with the training they need on the job can be difficult. It is often challenging to find time for employees to attend training sessions. Either training opportunities are off site and the travel time cuts into the work the employee needs to do, or the company schedules training sessions on site but the employee can’t make time to attend them. Companies are becoming more global, and as a result, the training expertise within the company may not be located at the same place as the employees to be trained. Even in the case where a company may have a single office, alternate work schedules and arrangements can make on-site training sessions a challenge. In these cases, the training sessions may have to take place remotely, which can lose personal interaction.

Even if an employee can make time to attend on-site training, the training environment may not be ideal for learning. Most likely it will take place in a conference room where the trainer will stand in front of the room and lecture. There is no opportunity for the employee to see real-world examples, or to feel he is in a learning environment that would mimic his real-world environment or experiences for which he needs to be trained. In the end, companies spend lots of time and money to train employees, but not to provide them realistic contexts where they can practice applying their knowledge or receive performance feedback from experts and mentors.

**BENEFITS OF IMMERSIVE LEARNING**

Immersive learning offers an alternative to overcome these limitations. Not only is the organization providing better training, they are doing so at a much lower cost and higher scalability than apprenticeships, preceptorships, or other live experiential training methodologies. There are no travel costs. There are no expenses trying to develop a live simulation in real-world environments. All costs are associated with the design process and the technology platform selected to develop and deliver the learning experience, which when calculated as a per-learner cost, can become negligible depending on the size of the population that will utilize the immersive learning experience in the organization.

Learners can be located anywhere and have access to an immersive learning environment, which frees up the significant restriction geography imposes on real-world training and performance feedback from mentors and experts. Depending on the structure of your design, learning experiences can be asynchronous, allowing for learners, mentors, and experts to participate when it’s convenient to them. Synchronous
learning experiences provide the opportunity to give real-time feedback to a learner during or immediately following training. In some immersive environments, like virtual worlds, synchronous learning experiences can be recorded as movies, also called machinima. Machinima can then be utilized as training resources to leverage for later reflection and debrief of the recorded event.

As an example, in sales training, it would be possible to provide immediate feedback to an employee, as that employee is engaged in the sales process within an immersive learning environment. In real life, if a salesperson visited a customer with a more senior employee to observe the sales interaction, the salesperson would not receive corrective feedback until the sales call was over. In the best case, the observer would step in and try to rectify things with the customers and then provide feedback after the sales call was completed. In an immersive environment, it would be possible to provide the salesperson with immediate feedback at the time she did something positive or negative. In this way she could immediately identify what she did well and what she needs to improve. The possibility for the employee to receive immediate feedback within an immersive environment opens completely new opportunities to improve the overall learning process.

While a sales training exercise may seem fairly straightforward, immersive learning is relevant for any type or level of employee. A Stanford Virtual Human Interaction lab study found that physicians practicing delicate surgical procedures in virtual environments learned the procedures just as well, if not better, than their counterparts who practiced on cadavers. For learning and training, these results show that practicing desired skills in an immersive environment can be just as effective as the more expensive alternatives of preceptorships, apprenticeships, and real-world practice (Larsen, 2009). It shows that this type of learning can be applicable even for some of the most difficult real-world skills training.

Numerous studies in different contexts show the same results: Virtual practice is as effective—or more so—as real-life practice (DeAngelis, 2012). Why is this? Immediacy of feedback—corrective feedback at the time of error—plus the ability to control the training environments to ensure the most common or most difficult scenarios are experienced and navigated by learners. In real life, you learn from the experiences with which you are presented. In immersive learning, you can control what experiences learners have, the feedback they receive, and the opportunities they have to see both short-term and long-term consequences. Author Malcolm Gladwell proposes that to become an expert, you need to spend 10,000 hours in the field of desired expertise (2011). He didn’t say that some of the experience couldn’t be virtual. What if, through controlled
Immersive learning, you could reduce the amount of time it takes to achieve expertise? What would that mean to your organization, to build expertise in employees faster?

Imagine the potential for business training when employees can be trained from any location, with no risk to the company, in an environment that mimics the real world to immerse employees in the learning process, for much less cost than real-world training. Expertise can be drawn from any geographical location, at nearly any time or even on demand, and with immediate feedback for the employees so they can get real-time positive or negative responses to their actions. Obviously this has a tremendous upside over nearly any other training option that exists today. This is the power of immersive learning.

Game-based learning has been on “emerging trends” lists for years. Each year, the prediction is that organizations will finally figure out that games and immersive learning experiences are more engaging and effective than traditional classroom and e-learning courses they’ve delivered. Another year passes, and organizations continue to deliver didactic lectures and formulaic, templated e-learning modules…and games are on the next year’s emerging trends list again.

LEARNING IN THE FUTURE

The learning industry is enormous and slow to adapt. TrainingIndustry.com estimates that the global market for training services grew to $292 billion in 2012, of which U.S. companies represent an estimated $132 billion, or 45 percent (2013). That’s just organizational learning, not including K-12 education or higher education. Anywhere that people are learning, we have an opportunity to design their learning experience. Too often, those responsible for curriculum development rely on traditional didactic methodologies, even when we know that the best way to learn something is through trial and error.

Why is it so hard for organizations to adopt a new curriculum strategy that is better than their current strategy? The truth is that instructional designers, teachers, professors—the professionals who are responsible for designing and developing learning experiences—are not trained in immersive learning design. It’s not because organizations don’t want better learning experiences; it’s because they don’t have the skill or experience to design them.

In an era when rapid development tools have ruled the market, instructors assume the problem is what people don’t know and the solution is to give them content. Immersive learning forces designers to start their process by identifying the problem, its causes, and context, instead of assuming that if you present learners with content,
it will change their behavior. Sometimes the problem is *what* people don’t know, but more often, the problem is *what people don’t know how to do*. The problem can also be *what people are not incentivised to do*.

As learning designers, we have to be armed with the right tools to address the problem at hand. Is it a knowledge problem? If so, a rapidly developed e-learning module might do the trick. But for complex decision making or context-driven performance issues, you need to create a learning environment that allows learners to practice, fail, and learn. You need immersive learning.

**THINK BIG**

Here is a starting point for how to design immersive experiences: Think about how to create opportunities for practice and skill-building. Technology will change, but good design is a constant. This book provides a framework for thinking in terms of immersive learning design, outlines the process of designing for immersion, and shows real examples of how organizations have applied these principles to solve various learning and performance challenges.

As you read this book, think big. Stop thinking in terms of what people need to know, and instead think about what they need to do. Think without limitations: How would you create a learning experience that provides opportunities to practice and build expertise? Then think about the technology available to make those opportunities scalable.

There is tremendous opportunity and potential with immersive learning, but you must, in the words of Steve Jobs—think different.
SECTION 1
IMMERSIVE LEARNING
WHAT IS IMMERSIVE LEARNING?

EVOLUTION OF TECHNOLOGY IN LEARNING

Before there were books, people learned by watching and practicing—trial and error. There were apprentices and squires, and knowledge was passed down through mentoring, live instruction, and feedback. This model was not scalable for many specialized skills, and the ability to learn new information, skills, or trades was limited by who you knew and who would agree to teach you. Books—as a learning technology—made instruction, if not experience, scalable. They didn’t replace the previous models of instruction, but added ways to learn for those who had access to books and were literate in this new technology. Classrooms added another method of scalability: alternately leveraging lecture, discussion, reading, demonstration, and sometimes practice, to help people learn en masse.

Unfortunately, the more scalable our educational models become, the less personalized they are and the less feedback learners receive on their performance. Education becomes more about what you know and less about what you can do. Even today, our educational system and our views on how people learn are primarily shaped by delivery methods that were designed for a society with barriers. That particular society no longer exists. We have struggled to adapt our educational models as our culture and our technologies have evolved.
In the 1990s, e-learning—or using computers as a means of delivering instruction—changed the face of adult learning. E-learning emerged as the potential of
technology to provide new pathways for learning. Computers held enormous potential for delivering instruction and providing information to learners who, for any number of reasons, could not receive live classroom training and for whom books couldn’t provide the necessary guidance and instruction. Organizations immediately saw the cost savings; live instruction is expensive. As e-learning became more accepted, trends emerged. Today, when people hear the term “e-learning,” they typically think of a screen-by-screen page-turner module, advanced by the learner via a “Next” button, each page including text and graphics and very likely a voice-over narration, with a multiple-choice “knowledge check” every few screens and a longer multiple-choice assessment at the end.

This is not immersive learning.

While technology has continued to advance, providing new ways of interacting with information and people, e-learning design has stagnated in many ways. Instructional design degree programs primarily focus on adult learning theory, basic elements of instructional design, and models for learning experiences informed by how adults learn but that reinforce the stereotypical e-learning module format:

**Repeat (Information Presentation + Reinforcement) then Assess.**

There have been trends to standardize and speed up the design and development process, coined “rapid e-learning,” and attempts to make this standard format more interactive than it actually is by adding attention-grabbing graphics, sounds, and more things to click on, a strategy Cammy Bean deemed “Clicky Clicky Bling Bling” (2011). But whether faster to develop or flashier to look at, most products of instructional design still adhere to the standard e-learning format established in the 1990s and replicated with wanton abandon today.

Curriculum design in education is not much better. The world is full of new technologies that allow us to interact with people and content in various ways, but classrooms today still look eerily like classrooms in the 1800s. In your average classroom, teachers are fortunate if they have access to interactive whiteboards, and students are fortunate if the teachers know how to use them as part of classroom instruction. In a 2012 survey of U.S. K-8 teachers, about half of the 505 teachers surveyed said they used games in the classroom (Barseghian, 2012). Games are not seen as core design strategies; they are still seen, even with kids, as supplemental to “real” learning activities. Although exceptions exist—like Katie Salen’s school “Quest to Learn” in New York that has integrated game-based learning across its junior high curriculum (2013)—the majority of public schools have not embraced gaming or immersive learning as common instructional practice.
There are exceptions in corporate learning, too, of course. More and more organizations are looking at games as a mechanism of increasing learner engagement. Virtual worlds, particularly in some sectors, have been increasing in popularity as a technology that can change how people communicate, collaborate, and learn. Social media technologies provide tools to easily facilitate informal learning that already takes place in organizations. Mobile technology is enabling on-demand access to performance-support resources. Augmented reality is providing new opportunities to weave together games, storytelling, and real-time information access. Simulations are providing realistic environments for skill practice to organizations that invest in them.

All of these technologies and design strategies shape the way we communicate, interact, and learn, and new technologies will emerge to provide new opportunities and to address unmet needs. But unless—and until—our design practices keep up with technological advancements, we’ll continue to see classroom PowerPoint presentations in virtual worlds or “game show” games created and delivered in the name of increased learner engagement. We need to move away from thinking about e-learning design in terms of reading a book or how we design classroom instruction. With the current technologies available, we’re able to now recreate the apprenticeship model of instruction.

**DESIGN PRACTICE WITH NO BARRIERS**

The concept of immersive learning design starts with a simple question:

**How would you teach someone something really important if you had no barriers?**

The question is simple, but the answer (or at least, getting to the answer) is not. Let’s take an example:

**How would you teach someone CPR?**

- Would you have them read the steps and then assess them based on whether they could remember the steps in order? Would that be enough?
- Would you have them go through a traditional e-learning module watching the steps to take, perhaps presenting different scenarios—then see if they can remember the correct steps to take given different circumstances and contexts?
- Would you have them sit in a class and have a CPR-certified instructor show them how to perform CPR on a dummy? Would you have students practice on each other?
• How much practice would you require to CPR certify someone?
• How would you measure their performance?

OK. **Now, how would you teach someone CPR** if you knew that someday *that person would have to use CPR correctly to save your life*?

Would you want them to simply read, listen, or watch? Or would you want them to have practiced all kinds of different techniques, with immediate feedback, on different types of patients? How much practice would you want that person to have?

CPR is a meaningful example because the skill of the person performing it could mean the difference between life and death. When someone knows what to do and
how to do it, they also need to be able to do it correctly. It’s also an example of a skill that is tough to really practice—and get enough practice in to be useful. Fortunately, there are not daily opportunities for everyone to practice CPR on real patients.

CHARACTERISTICS OF IMMERSIVE LEARNING

I often get the question “What’s the difference between a game, a simulation, and a virtual world?” Some, like Clark Aldrich, have attempted to answer that question through discussion of features unique to each design category (2013).

Immersive learning environments actually encompass all of these mediums, and more: mobile learning, augmented reality, alternate reality games, 3-D environments, and maybe holograms someday. The truth is, the technologies and labels are blurring. Design principles of immersive learning are what bind games, simulations, and virtual worlds into this category of immersive learning environments. To a certain extent, all immersive learning incorporates each of these principles. Depending on which principle is more emphasized will lead people to label an experience a game, a simulation, or a virtual learning experience.

**IMMERSIVE LEARNING CATEGORIES**

Here are some of the relationships between immersive learning categories.

Graphic courtesy of Koreen Olbrish Pagano.
DESIGN PRINCIPLES

Realism: The extent to which the environment in which you are immersed is lifelike.

Learning environments play a role in how effective the learning can be. Environments that have a high degree of realism may be referred to as “mirror worlds.” The more realistic the environment, the easier it is for learners to make the connection between the tasks they complete in the mirror world and their real-world environment. There is a flip side to realism, however. While some tasks are easy to realistically simulate, others are much more complex or are specific to an organization. The more realistic you create your environment, the more you may challenge the learner’s suspension of disbelief, especially if any of the content or setting in the environment violates their expectations.

In 3-D animations, this violation of expectations is called the “uncanny valley,” which describes the human psychological reaction to seeing a human robot or 3-D character that is almost realistic, but just unreal enough to cause a strong reaction of: “This is not a real person.” In immersive environment terms, this feeling will manifest itself in reactions such as, “This is not how we do things,” or “That’s not how a customer would really act.” When this reaction occurs, the learner may dismiss the entire learning experience as unrealistic. Depending on the performance objectives, and when contextual discrepancies have the potential to derail the learner’s buy-in to the practice experience, a more unrealistic environment or story line may better serve the learner’s needs. Typically, the more realistic the environment, the more the experience is like a simulation.

Achievement: The mechanism by which success toward performance goals is measured within the immersive learning environment.

For this design principle, you must have identified goals, a mechanism for learners to practice the skills needed to achieve these goals, and a measurement system for showing learners how close they are to achieving each goal. Think of achievement as performance metrics—or in gaming terms: how close you are to winning.
Achievement may be indicated for a single goal, or there may be multiple achievements to obtain as part of the immersive learning experience. In addition, there may be incremental achievements that help learners benchmark their progress.

Competition may be part of the achievement. One critical consideration for measuring achievement is deciding if you will benchmark against your past performance, standard accepted levels of success, or in comparison to others. Achievements may be individual or team-based. In mirror-world environments, achievements are often (and should be) the same success metrics someone would see as part of their job. For less realistic contexts, an additional “achievement layer” may be added to help learners gauge their progress against performance expectations. These achievements may take the form of high scores, badges, leveling up within the environment, or other means of special recognition.

Presence: The extent to which the learner feels like she is connected or present immediately within the immersive learning environment.

Presence, in its essence, is the psychological connection that the learner makes with the tasks being performed or with the decisions being made in the immersive learning environment. One element of presence is the role of the learner within the story line. Another aspect, particularly for environments that are visually immersive, such as virtual worlds or 3-D environments, is the point of view of the learner within the environment. This point of view is either first-person or third-person. In some environments, the learner may be represented by an avatar; in some story lines, the learner is the lead character in the story. The importance of presence relates to relevant practice; if the learner feels a strong sense of presence within the environment, the practice itself will feel more real and will be more tied to performance outside of the immersive learning environment.

A FEW THOUGHTS ON IMMERSIVE LEARNING TECHNOLOGIES

This is not a book that focuses on how to build immersive learning environments, only how to design them. Yet immersive learning design assumes technology has advanced to a level that allows us to build immersive learning experiences in many ways, using different technologies. In chapter 5, much more will be discussed about the pros and
cons of different technology selections for developing your immersive learning environment. For now, and to frame the design discussion in the next several chapters, here are some of the commonly used technologies that can be leveraged in immersive learning design:

- game engines
- 3-D immersive environments
- virtual worlds
- mobile technologies
- augmented reality applications
- social media platforms
- websites and basic web development tools (for example: Flash, HTML5)
- console games.

And there are sure to be new categories to add. The point is that immersive learning is not about the technology; it is about the design principles that allow learners to practice in context, apply their knowledge, and improve their skills and competence. While technology selection is an important element, there are multiple technologies that can be leveraged to create an immersive experience. The most critical aspects of immersive design are the elements that create the feeling of immersion and make the practice authentic. Technology selection should support those goals, and should not be the first step in the design process.