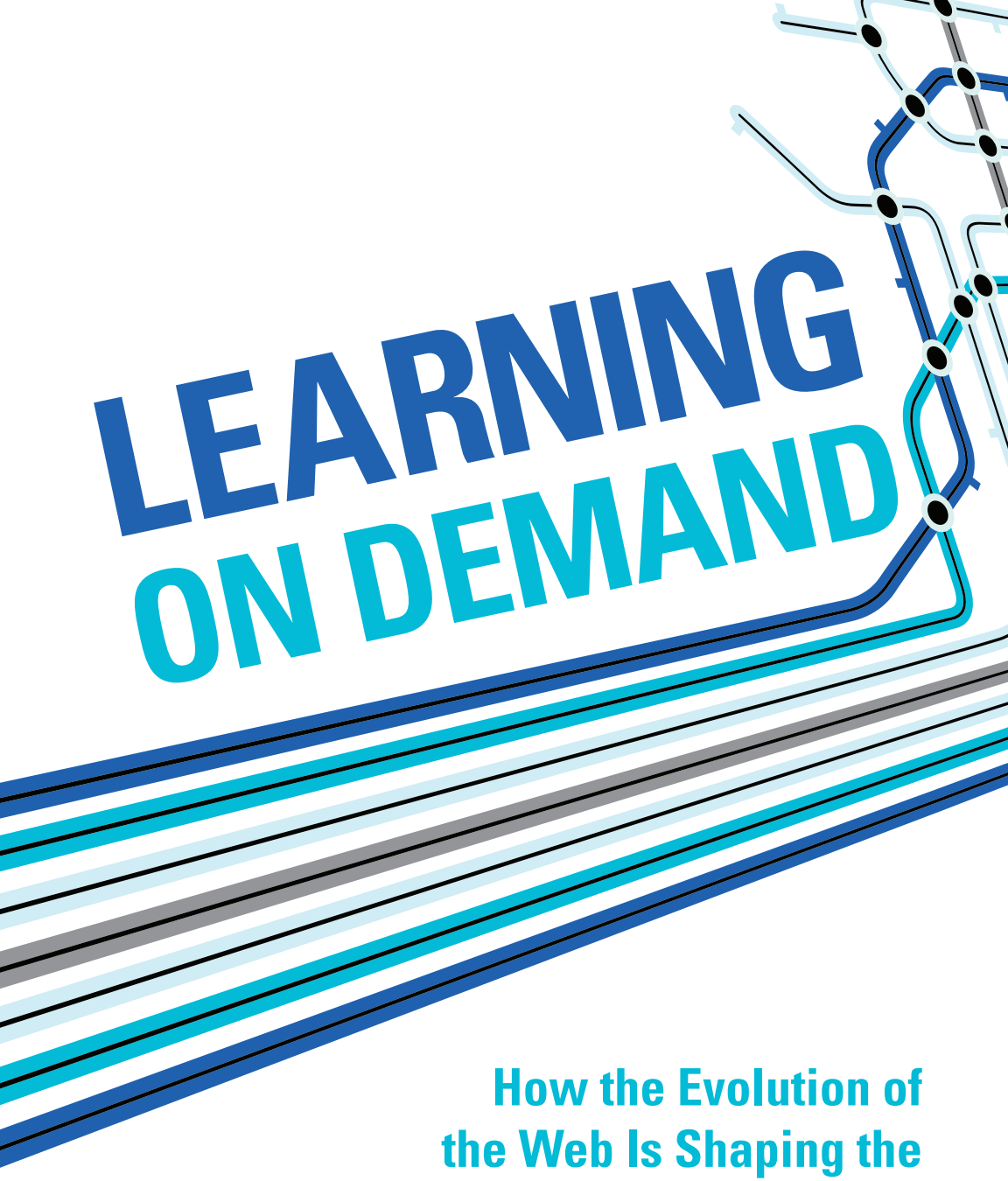

# LEARNING ON DEMAND

## How the Evolution of the Web Is Shaping the Future of Learning

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Foreword by Tony O'Driscoll

# Chapter 1

## Training With the Evolving Semantic Web

**In this chapter, you'll learn about**

- How to master key foundational skills like supply chain management
- How to manage the creative process and leverage technology
- The semantic web and the web's evolution

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What do instructional designers need to know about the business world to succeed in today's extremely fast-changing corporate environment? Even though the content of work is evolving at a searing pace, many of its basic principles are still the same, and thus designers need to master key foundational skills like supply chain management, how to manage the creative process in which they are always engaged, and how to leverage technology. This chapter explores these and other topics, and also introduces the semantic web in detail. But first, I will set the stage with the tale of a seminal experience that for me embodies all these topics.

## From Student to Project Boss

There I was, sitting in the back of a sport utility vehicle with five other people, only two of whom I had met previously. My stomach was in knots. I was about to be paraded in front of the top learning brass of a large grocery chain as a Montreal multimedia consulting firm's "instructional designer."

The vice president of this firm, whom I had just met earlier that morning, had submitted a proposal on a computer-based training initiative and had won the bid. The firm's proposal included the involvement of an instructional designer, about which they knew very little. So began their journey as an "e-learning company" that was frantically reaching out to find out what an "instructional designer" was. In their grasping, they connected with a friend of mine, who in turn gave them my contact information, and so began my journey as an instructional designer.

At the time, I was a graduate student in educational technology, one year into the program, and I was looking for real-life experience. And boy, did I get it: Within one eight-hour workday, I was transformed from a student into a full-time instructional designer, a project manager, and a production manager. And my ride in the sport utility vehicle turned out to be nowhere near as surreal as waiting to meet the learning brass from the grocery chain—only to see one of my professors leaving the meeting room with the same people I was seeing. I was competing with my professor for this project.

The next evening, the professor told our class the story of meeting me and spoke about the dangers of the grocery chain project for which we were both competing. He talked of scope creep, unclear objectives, and other nonsense that I would reflect on two years later—as the project was collapsing. By that time, a project that had been scheduled and budgeted for three months was two years in the making, and the client was still not happy. Who was to blame? Me.

I say "me," but I realize that my boss was also surely to blame because he had put me in the position where I could single-handedly influence a project

to the degree that I did. I often debate with industry peers on the challenge of an instructional designer also serving as project manager. The nexus of my argument against this doubling of roles can be found in my first experience doing just that. Many of you reading this book are probably managing projects and also doing both the instructional design and the development in your organizations. Many of you would probably disagree with me that instructional designers shouldn't double-time on project management. The debate is a worthy one to have—but not here.

As both the instructional designer and overall manager for the grocery chain project, I pushed the boundaries of the digital learning experience for my client, asking my team of graphic designers and programmers to build games and simulations. And nobody at my consulting firm reined me in. The grocery chain wanted an instructional designer to drive, and I was let loose. My designs dictated the project's scope and had an impact on the bottom line in ways with which I was then unfamiliar. Although the team must have questioned how the firm was ever going to make money, how could they argue? I was the instructional designer.

Two and a half years went by, and we delivered a product that had gone over budget by about two years' worth of work. But I did learn quite a bit from this experience—along with others, serving as an executive director, product manager, and consultant—about supply chain management, about managing the creative process in which instructional designers are always engaged, and about leveraging technology.

## Supply Chain Management: Not as Boring as It Sounds

Supply chain management is an important concept for instructional designers to learn. If we look closely at the time and the cost required to design and develop off-the-shelf e-learning versus custom e-learning, we can learn a lot about the concept of supply chain management. For this comparison, assume that the quality resulting from both types of e-learning is the same. What is it about building off-the-shelf versus custom e-learning that makes the former more efficient? Why are the design and development of an off-the-shelf product faster and less costly than a custom course?

The idea that off-the-shelf production is a more efficient and cheaper process than custom development applies almost universally across industries. Think of making yourself a table from scratch versus producing huge quantities of tables for others. What would you do to make the process more efficient? You'd probably start by buying tools to make your work easier and more efficient. You'd use the tools to shape the wood, assemble it, and move the finished tables. But at some point, you'd look at how to automate some or all of the process so machines could do the heavy lifting, so to speak. Yet before you brought in the machines to automate the process, you'd need to create a template of what the table was going to look like and adjust the machines to recreate your template over and over. Likewise, e-learning can in essence be mass-produced. For instance, as a product manager for an e-learning vendor, I managed a team of resources dedicated to building a library of off-the-shelf e-learning courses. Having only managed the design and development of custom e-learning in the past, I was amazed at the productivity of a small team of qualified people—and it was all in the supply chain management.

Our product already had a look and feel. Our product already had canned exercises and assessments that were applied to content. Most important, our designers knew what activity types to apply to which types of content. There was a high degree of predictability in our process, and a lot of the creativity that consumes resources in a custom build was set aside. Some of the activity types we built into our courses were automated, but we hadn't really figured out a machine to completely automate the process.

The one element that really made the difference was the structure that was given to the instructional designers in the off-the-shelf courseware development team—not the technical structure but the instructional design structure that mapped how to treat content with similar learning objectives with the same limitations and opportunities inherent in the product. The instructional designers who were assigned to design the content analyzed the raw content, associated learning and performance objectives with this content, and then mapped the content on the basis of their learning objectives and performance objectives to the feature set of the product.

If I were to distill what worked with the off-the-shelf course that would also work with custom e-learning, I would propose the following:

- Find a cognitive theory or model that fits with the bulk of our work.
- Market to our clients that we subscribe to this theory and that there is academic evidence to support the theory's viability.
- For each "category" within the cognitive model we've chosen, build out a series of web screens that are mapped to the learning category.
- Show how each screen uniquely addresses the expected learning outcomes of the learning category. In other words, what the learner does on-screen accurately reflects the behaviors expected from the level or category within the cognitive model.

- Use these screens as a selling point to demonstrate an ability to produce large volumes of content for our clients in a predictable, understandable way.

- Allow our clients to brand or customize the look of every screen, but ensure that the screens remain the same programmatically.

- Shift our instructional design process to be more of an information-mapping process than a free-flowing, creative process.

- Always allow for the instructional designer to break out of the mold if required.

These steps can be followed or adapted in other situations where you want to be able to mass-produce content. Let's look at an example of how this can work. Company ABC is about to launch a new product, and so the top managers decide to train its sales force to be able to explain the benefits and features of the product versus those of its closest competitors. Company ABC would like the training to focus on handling objections because it has set its strategy to go after its competitor's clients.

Imagine being part of a custom e-learning design and development shop, where most of your projects deal with product sales. You have therefore identified common learning objectives and performance objectives that seem to apply to most of your client's projects, regardless of product and even client:

- The learner is able to demonstrate active listening by repeating questions back to prospects when asked.

- The learner is able to list the benefits and features of the product when asked by a prospect.

- The learner is able to successfully pair client's needs with the right product.

The process of grouping similar learning and performance objectives together into generic objectives is essentially the building of a cognitive model. Using the cognitive model in this example, I have identified the following online activities that help learners achieve these goals:

- Play an audio file and the learner must identify key points that were present in the audio file.
- Create a list by selecting items from a larger pool of items based on a question asked by a prospect.
- Match product features with a list of needs.

For each of the activities, I have created a variety of sample web screens for each activity that I can show a client:

- Option 1: Uses talking avatars and a text box.
  Option 2: Static images with audio file and text box.
- Option 1: Game-like interface with a timer.
  Option 2: Drag-and-drop interface.
- Option 1: Drag-and-drop interface using text only.
  Option 2: Drag-and-drop interface using a combination of audio and text.

There are fundamental differences between the approach laid out here and a traditional approach to the custom design and development of e-learning. The essence of these differences is the separation of the instructional approach to fulfill the learning and performance objectives with how this approach looks and feels on a computer screen. It's the identification of elements that support learning regardless of the look and feel. For an example from another part of the computer world, see the sidebar.

The process for the cognitive model of learning is not radically different from the object-oriented programming model for software development, whereby data used by software are not hard-coded into the functions of the software.

## Managing the Creative Process by Leveraging Technology

To an instructional designer, the thought of automating the creative process of developing an online course seems unreasonable. I agree. I'm certainly not trying to remove the instructional designer from the design and development of e-learning. But I am trying to reorient the skills an instructional designer requires in the future. Web applications are becoming increasingly powerful. They know who we are (Facebook), they know where we are (Global Positioning System), and they will know what content we need and when. This is the essence of the World Wide Web 3.0—again, known as the semantic web, which is explained in more detail below.

To return to the hockey analogy, as was explained in the introduction, web 3.0 is our "intelligent hockey stadium." For instance, instead of following the conventional custom e-learning design and development process (which treats individual pieces of content one at a time), or using templates in a simplistic fashion, the semantic web makes possible a much more dynamic, responsive experience. The templates that designers work with today contain standardized functionality, with a look and feel that can be adapted. Thus, because the functionality is already locked, designers are left to stuff content

into a template that may or may not have the elements needed to support the learning experience.

For example, far too many online courses use an assessment with a multiple choice or true/false format at the end of the course, regardless of the subject. Why? Because multiple choice questions are easy in all respects, and there are tons of available templates. Nonetheless, most instructional designers would agree that in many cases the multiple choice format is completely inappropriate for the level of assessment required.

Multiple choice questions test a learner's ability to recognize the right answer. A multiple choice test does not assess the learner's ability to execute a task, solve a problem, or perform other higher-order thinking skills. All instructional designers know this, but we use these tests anyway and try our best to write "good" ones. However, when we recognize that multiple choice questions are an inappropriate format for the level of assessment we're trying to implement, we are recognizing that, structurally, this type of test does not have the elements required to support our targeted learning experience.

When I proposed a new approach for the custom design and development of e-learning to my boss at the time, my idea was to instantiate things like multiple choice as part of a cognitive model where "identification of the right answer" was the learning experience. This approach would find success by streamlining the storyboarding process as well as the production of a course. Storyboarding is no longer a page-by-page creative process. It is a process of moving raw content into a cognitive model based on its associated learning and performance objective. The cognitive model dictates the elements of design for an instructional designer. The time and effort needed for development are significantly reduced by limiting custom programming and streamlining quality assurance testing.

In chapter 5, we'll thoroughly explore this process, which requires new types of skills from the instructional designer. Throughout this book, I seek to show why these skills are important for an instructional designer, who will use them in a world where technology can automate much of the manual labor of assembling courses.

## The Semantic Web and the Web's Evolution

It just so happens that what makes supply chain management so efficient for e-learning is also what makes a semantic web possible—structure! In his book, *Weaving the Web* (1999), Tim Berners-Lee sets the stage:

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> I have a dream for the Web [in which computers] become capable of analyzing all the data on the Web—the content, links, and transactions between people and computers. A "Semantic Web," which should make this possible, has yet to emerge, but when it does, the day-to-day mechanisms of trade, bureaucracy and our daily lives will be handled by machines talking to machines. The "intelligent agents" people have touted for ages will finally materialize.

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The web in its earliest form was always conceived of as network of hyperlinked information, where information was grouped, tagged, and accessible through other information. "He was certain that every document in the world should be a footnote to some other document, and computers could make the links between them visible and permanent" (Kelly, 2005). As the web evolves into this, it has on its path digressed, but slow and steady it is

coming around. We began with web 1.0, are now in web 2.0, and are forging ahead to web 3.0.

Web 1.0 could be defined simply as an interactive and visual web, its defining service being the search feature; while web 2.0 evolved into a programmable web, characterized mostly by a sense of community, through the use of blogs and eventually social networks. While web 2.0 is essentially an array of applications and social media tools, web 3.0 is more of a concept of how the Internet should work and is mostly commonly referred to as the semantic web. Contrary to some perceptions, web 3.0 is not a replacement for web 2.0, but rather an evolution of it. Web 3.0 can be defined as representing a range of Internet-based services and technologies that make data more understandable to machines, and by doing so makes information easier to find and more understandable to people (ASTD, 2011).

Web 3.0, the semantic web, is the bookmark that will start the era when the web achieves its initial vision, and is still—according to many experts—far away into the future. Rest assured though, that the web is moving in this direction and there are many trends that support this.

While the web surges forward and grows into what it was meant to be, it seems as if it is sweeping everybody and everything into it. Some people, media outlets, and self-publicized thought leaders even discuss that as the human race evolves, its evolution is directly entwined with the evolution of the web, so much so, that the web appears as an extension to our own evolution. We see the reflection of this evolution with almost everything we create today. We put chips into everything so that we can communicate with inanimate objects. We integrate the web into our entertainment, communications, business, and family. We extend ourselves and all of our relationships into

the web and create avatars of ourselves. Our digital selves talk with, share with, and interact with a world of other digital people who we've never met outside the web. We've even changed how we speak to each other outside of the web to accommodate new protocols founded through communication over the web. We have commerce, virtual worlds, and programs that are beginning to understand "natural language." And thus the semantic web will be able to understand the difference between:

- Fred saw a plane flying over Zurich.
- Fred saw a mountain flying over Zurich.

The semantic web understands that mountains can't fly, and therefore it inherently understands the second sentence as Fred was flying over Zurich when he saw a mountain. And therefore, if you use the semantic web and reference this sentence, it will know whether what you are referencing makes sense within the meaning of the content and will disregard all nonsensical inferences.

It is not surprising, then, that almost all industries are evolving to incorporate the web into its natural order of things. There are two general ways in which industry does this. The first way is to use the web in some capacity to streamline its own business. And the second way is to plug into the web along with its customers. Using the web for businesses used to mean setting up an online store where goods and services can be purchased. This has evolved into complex marketing campaigns where consumers are able to interact with the organization itself. It is about the experience and the engagement that come from the participation. Consider Jell-O brand's latest marketing campaign, the Jell-O mood meter. The mood meter is a live read of the Twitterverse scanning for emoticons depicting smiles and frowns. When the

Twitterverse trends toward frowning, the Jell-O mood meter visually shows a frowning face and begins sending Twitter followers a link to free pudding. The fascinating part to this for me is the automation. A web application completely left alone analyzes real-time data and interacts with virtual people all on its own. In addition, the virtual people who represent real people engage with a web application—in a somewhat stinted conversation, but a conversation nonetheless. Man is conversing with machine.

With respect to improving one's own business processes by webifying them, consider that more and more commerce is now being done over the web, along with marketing, accounting, and project management. Companies are restructuring based on mobile workforces, tapping into talent across oceans, providing local service through international offices, and harnessing consumer trends like never before. However, it is true that you can't turn a culture that is not social in nature into a social culture by implementing tools (Bozarth, 2011). We are nonetheless seeing an evolution in social cultures through tools and the evolution of tools through social cultures.

Our evolution as a society is deeply entangled with the evolution of web technology. We have moved beyond building tools to help us communicate; we have built tools that are in return building us! The language that was at one point reserved solely for chatting with someone online is making its way into face-to-face conversations. Our online language allows us to express ideas and emotions differently. A great example of this is a hashtag I've seen in Twitter a lot, "#fail." This hashtag is used as a comedic expression of having messed up. For example, "Just finished building a deck in back. Looks horrible. #fail." It's not uncommon now to hear people say out loud "hashtag fail" to bring a comedic sigh of relief to a potentially stressful situation. The story of web technology is no longer only about tools to help us do something

better. It's a story of coevolution, whereby technology and society are interdependent. Web technology breaks down the lines between work and play, family time, and work time. It is as though the technology is grafted into our lives in an intelligent way so that our use of it is seamless. We don't have to stop doing what we're doing to use the technology. We use it as part of our lives—as we use it, it also evolves.

Imagine that we could apply this model to training. Imagine using technology to enhance our productivity at work rather than stopping our work to consume training content. Imagine that content is built into our environment through technology. We are at this point. Technology can help us create self-organizing groups, learning on demand, and a networked system that interfaces with all facets of the organizations where we work. To accept this promise is to accept a radical shift to the paradigm of training and development. It is a shift that will entail re-engineering and reconfiguring the training function, as part of operations or even marketing, to ensure that it is better supporting the business. This new view of training, however, is based on established systemic approaches; for an example, see the sidebar.

## The Dick and Carey Systems Approach

Walter Dick and Lou Carey's Systems Approach Model for instructional design—initially published in 1978, and presented very eloquently in their 1996 book *The Systematic Design of Instruction*—set out a very simple yet elegant process for designing training or education. The model is based on a process of analysis, design, development,

implementation, and evaluation (ADDIE). The ADDIE model is a difficult model to discredit since it has a very common sense approach and is an established business analysis model. In essence, the approach states that before you can develop a solution to a problem or to meet a goal, you need to understand the need. Once you have a good understanding of the need or requirement you can design the solution without spending the dollars to actually have it developed. Once it's developed you can implement it and then evaluate it for success. Over the years the model has seen refinement; it has evolved to suit rapid prototyping and remains a fixture in the instructional design landscape. It is the model on which most instructional designers create online learning.

I am a believer in Dick and Carey. I believe we need to look at our requirements, and look at our needs based on the five tenets for the web's will to create a new design imperative. Dick and Carey didn't create their model at a time when the world's collective intelligence was online and on demand!

Observing our use of the web disrupts some of the assumptions we've made in training over time. The web has shown us and has proven that learners are able to close knowledge and skill gaps themselves. People are able to search for and retrieve the information they need to move from *I can't do it* to *I can do it* without any sort of formal process being in place that's controlled by an expert. To a small degree, we accommodate some self-directed training in our conventional training delivery model through what we call *performance support*. Performance support used in conventional contexts is simply a side note. It is

something to accompany training, not to replace training itself. Part of the issue is in our preconceptions about the limitations in self-directed learning and how we define a "moment of need."

Self-directed learning is not something that we typically reserve for "learners" who are new to a subject or skill. Our theory is that novice learners don't know what they don't know, so how could they direct their own learning? A person who is being introduced to a subject or skill needs the right foundation, the right scaffolding to help them build the mental models, and skill sets to become proficient. This is our conventional wisdom. In chapter 4, I introduce Sugata Mitra's Hole-in-the-Wall experiments, which demonstrate that learners with no previous background in a given subject are able to acquire 30 percent of what they would need to pass a test without any formal solution or initiative at all. These are learners who don't know what they don't know. Add in some facilitation into the mix—not formal education per se, but some degree of facilitation, with subject matter being acquired through self-directed learning—and the results are even more convincing.

I am not trying to say that learning doesn't need scaffolding. I am questioning conventional wisdom about a person's ability to create his own scaffolding. I also question our definition for "the moment of need." We typically reserve this moment of time to discuss when somebody is actually in the process of doing something, acting on, researching, and so on. We would rarely if ever use this to capture moments such as "first week on the job." First week on the job is just too vague to lump into a moment of need. It is because we think of training as an event as

opposed to a fluid stream of experiences or activities that limits our use of moment of need. In fact, from a common sense perspective, when would we do training at a corporate level outside a moment of need? Isn't that like saying, you don't really need this, but here it is?

When we apply Dick and Carey's model to the corporate training world, we end up talking a lot about competencies. The needs gathering stage identifies learners and environment but a big slice of the analysis is generally around what a worker needs to know and do after training. The assumption we all take for granted is that the training is the event to close the gap between unable to perform and successful performance. There is also a belief that closing the gap happens during training and the reinforcement happens on the job. We currently design our training materials based on the assumption that we need to deliver the learning itself. Our deliverables need to be packaged nicely, and must contain the bridge that walks a person's mind and body from *I can't do it* to *I can do it.* We have always assumed that the instructional designer controls this by doing the needs analysis, uncovering the gap, and then designing and developing ways to bridge the gap.

It is the premise of this book that training and development needs to better leverage technology to serve a new and constantly evolving model of education and not fall behind the times. As a result, innovation within training and development needs to find ways to build tools that facilitate this new model. Thus, innovation in training and development needs to become more

in tune with the web's natural evolution elsewhere. For more perspectives on the web's evolution, see the sidebar.

## Perspectives on the Web's Evolution

The evolution of the web has been characterized differently by different people at different times. For instance, Kevin Kelly—one of the founders of *Wired* magazine, a known "futurist," and a recognized researcher of web trends—presented the web's evolution in a series of talks. In his TED talk "Predicting the Next 5,000 Days of the Web" (2007), he discussed how the web has moved from sharing packets to linking pages and is now heading toward linking data. Sharing of packets is when an Internet user manually shares a packet of information with another user, not unlike faxing something to somebody.

The web in its current form is in the "linking of pages" phase. Internet users no longer have to manually send packets to other users to share information, they can put up a page and others can link to it. The web contains trillions of links and exchanges terabytes of data per second, all working through pages that are linked to one another.

In the third stage of the web, data are linked to data through a shared relationship that web applications can understand. Pages linked to other pages have links that physically appear in the page itself. This is what allows a web user to move from one page to the other. The content within a page is irrelevant to our current web applications. Future web applications will be able to link pages together for users based on

the web application's ability to draw relationships between the content itself, thus linking data to data. The link between data is found in the meaning of the content.

For example, Montreal and Toronto are both Canadian cities. In a web that links data to data, a relationship is drawn between these two pieces of data by web applications through a variety of mechanisms that help the application understand the relationship. I discuss these technologies at length in chapter 3. Ultimately, a web application would be able to determine that both are cities and that both are Canadian, and that they are in adjacent provinces.

The shift required in training and development is innovation supporting the fluidity with which people are learning while performing. Most of us don't naturally learn from 1 p.m. to 2:30 p.m., but learn through the infusion of experience followed by repeated cycles of experience and reflection. Where the experience begins and ends is different for everybody, and reflection on experience is a mixture of personal baggage with the contents of the experience.

Given that learning in a corporation is used to support performance, why isn't training a tool in the performance support utility belt, instead of performance support being a tool in the training utility belt? Consider an example that explains this situation and how it might change. A very large, influential Canadian government corporation has a well-established training and development department, which spends all its efforts designing training solutions that include all the greatest hits—classroom, e-learning, job aids,

online synchronous. Another important department is engineering, which is responsible for the efficiency of the plants and equipment. The corporation, though profitable, was not meeting its own service levels, and so it asked its training and engineering departments to find out why.

As consultants hired by the training department, my colleague and I focused our investigation on the tools in place to ensure that the folks in the plants were performing to full potential. We found there really were no consistent descriptions to enable the firm to define and measure job-ready resources, the skills required, and performance levels.

For instance, when we broached the measurement issue with engineering, we were told of a department made up of 350 people who stared at computer screens, looking at the real-time data flashing and scrolling past. As these data flashed on the computer screen, the employees looked for data patterns. The data were being sent to these monitors from the actual equipment in the plants—from retail outlets, human resources systems, and all other kinds of systems. The data appearing on the monitors were apparently so rich that the person speaking with us described how they caught an employee stealing from them simply by tracing data patterns of time, place, and product type.

As data passed on the screen, those reading them and finding patterns were able to pinpoint machines, people, and processes that were not working according to standard operating procedures. They were able to identify a problem with machine x, in location y, and based on the patterns determine human error, machine error, or other error types. When human error was recognized, somebody from the team was dispatched to the location to meet with the person causing the error and regulate the issue. The person

sent out to solve the problem was highly skilled and knowledgeable about the standard operating procedures and corporate standards and coached the individual on exactly what they needed as determined by the data received.

What makes this scenario so fascinating? First, the training department knew that this was going on, but it didn't interface with this group nearly as much as it should have. Second, all learning systems would have shown the people in their jobs as having learned the content and therefore being job ready. Yet the engineering systems were very clearly showing different data. I would also argue that the data coming out of engineering were simply more critical to the business than the training data. Do we need to ask ourselves why training is siloed? Thus, this example demonstrates the clear divide between *learning* and *performance*.

My experience working with this organization reinforced the need for training and development staff members to plug into what makes a business tick. Instead of only focusing on individuals, training and development teams must learn how an organization's systems function, and must also develop new analytical models rather than the ones we have used for learning.