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Connections in a Tangled Web—Web Training That Works

By Jacqueline Justice, Ph D, and Judith Dulberger, DA
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A mind is too complex to fit the mold of narratives that start out here and end up there; a human intellect depends upon the connections in a tangled web—which simply wouldn't work at all if it were neatly straightened out. (Marvin Minsky, The Society of Mind, 1985, 322)

Introduction

Sensible choices about web training begin with a simple truth—to be effective, web-based training (WBT) must be informed by theory and built on clear instructional goals.

Web-based learning—it's an exciting, even a poetic, prospect. Think of it—hypermedia creates innumerable bridges from information node to information node in much the same way that the brain's synapses transmit impulses across web-like neural pathways. We can look at it as a form of instruction that comes closest to replicating the mental processes by which we learn.

Anyone who has perused the courseware offered by web-training organizations knows that, despite the fact that all claim to be creating learning tools that function like our own minds, online learning takes many diverse forms. Obviously, with so many "experts" claiming to have THE online learning solution, it can be difficult to select an approach. What types of web training really work? How do you begin to choose?

Sensible choices about web training begin with a simple truth—to be effective, web-based training (WBT) must be informed by theory and built on clear instructional goals. This is true no matter what your training needs: enhancing people skills, teaching proper workplace procedures, building technical expertise, or improving on workplace problem solving. This paper identifies and describes the theories and goals behind the **ontimetraining.com** approach to WBT. Specifically, you will learn how Behaviorist, Constructivist, and contemporary Adult Learning theories shape our training.

WBT—An Overview

Because we remain well grounded in instructional theory, the self-directed, self-paced nature of **ontimetraining.com's** *WBT leads to the independent decision-making, the work-readiness, and the knowledge transfer that is so critical in today's society.*

From one perspective, Web-Based Training (WBT) or Web-Based Learning (WBL) represents a third-generation form of distance education born out of the convergence of computing and telecommunications technologies of the last few decades (Thorpe, DE, 19(2) 1998). Computer-Aided Instruction (CAI) or Computer-Based Training (CBT) and its stepchild, the CD-ROM, have joined with video-conferencing, the Internet, Intranets, and the World Wide Web to create the phenomenon of WBT. But effective WBT is more than just a high-tech means of connecting educators and learners who are spatially separated. It is more than a means of delivering information and training to individuals anywhere in the world at any time. These are both important characteristics of WBT (and "a tall order"), but it takes much more to be good instruction.

There is an added dimension to WBT as practiced by **ontimetraining.com**, one derived from the convergence of the technical capabilities of the web with cognitive science and instructional design theory. In its entirety and at its best, WBT is not just the technical format, "but the whole presentational style, the user interface, the accessibility, the interactivity" (Daniel, 1999). It's the "hypermedia," the interconnectivity of text, sound, still pictures, graphics, and video arranged non-linearly, and representing not only a quantitative change but also a qualitative, theory-based

change in the entire instructional process. By embracing both the quantitative and qualitative aspects of this change, **ontimetraining.com** has built an instructional system based on the premise that what happens to information does not depend solely on the medium by which it's delivered (computers, Internet, Intranets, etc.). In the end, it is the learner and the extent to which he or she constructs meaning from that information that determines whether or not WBT has been successful.

For web-based instructional designers and theorists this has meant shifting the focus of concern from teaching and instruction to learning. Not all WBT deliverers have practiced this successfully, however. In reality the focus has tended to move first from teaching to technology, where media choices, vivid graphics, and interactive modules often precede or supersede learning objectives. As technology has pushed theory aside, a lot of WBT design has come to reflect what's "possible" rather than what's necessary to effective learning.

Despite these initial disappointments, few seriously question the benefits of web-based learning. It's immediate. It's accessible. It's economical. Its interactivity promotes effective learning outcomes. It's learner-friendly. It's free of constraints of time and place. Any serious disadvantages only await technological solutions. The interactivity, the hyperlinking, and the multimedia capabilities of WBT make it a tool for mediating knowledge in new and exciting ways. But the focus must remain on the learner rather than the technology. Technology for technology's sake is counterproductive in the educational process.

For **ontimetraining.com**, the choice is clear, technology must go hand in hand with learning objectives. Adhering to carefully selected instructional design models allows our curriculum designers to promote learning readiness. Following step-by-step methodologies encourages learners to build and apply knowledge effectively. Because we remain well grounded in instructional theory, the self-directed, self-paced nature of **ontimetraining.com's** WBT leads to the independent decision-making, the work-readiness, and the knowledge transfer that is so critical in today's society.

| Behaviorist Learning and WBT |

Because learning under the Behaviorist scenario is a form of behavior modification, the instructor's responsibility is to construct an environment in which the correct behavior of the learner is reinforced. Testing is a matter of designing rewards for correct answers and objectifying results. Few deny that this type of learning reinforcement can be effective. And so **ontimetraining.com** *courses incorporate aspects of this simple approach in WBT.*

In order to be effective, learning must be theory-based and grounded in some model of instruction (Schneider, 1994). But which theory and which model? Theories are really nothing more than explanations for why things work the way they do. Some theories are verifiable (such as the theory of relativity) and some are only conjectural (such as theories of leadership). Or there are the simple learning theories such as, "people learn best by doing," "people learn best from observing others," or "people learn best through trial and error." Models, on the other hand, are step-by-step methods for getting from one place to another while meeting goals and objectives. They are flow charts and instructional aides, strategies and techniques.

There are more than 50 published learning theories in the cognitive sciences alone. Instructional models are abundant as well, and, more often than not, are modified and adapted to meet the needs and objectives of instructional designers. Designers can and do even create their own models. But chances are they will use many theories and models over the course of time as circumstances warrant.

Anyone over the age of 30 probably has been weaned on the Behaviorism of B.F. Skinner and his concept of behavior modification and programmed learning. Basically, Behaviorist theory rests on

the belief that all forms of behavior (and that includes learning) are composed of simple stimulus-response events that can be seen and measured. More complex learning is the gradual building up of larger and more complex patterns of stimulus and response (Perry, 1997).

In the case of human beings, Behaviorist theory is not illustrated quite as blatantly as it is with Pavlov's dogs. Nevertheless, reward and punishment (whether grades, praise, monetary compensation or the loss thereof) form the basis of human learning, according to Behaviorist theory.

From the outset, Skinner had great enthusiasm for the promises of the computer as an efficient teaching machine, and he felt Behaviorist theories could be tested and confirmed through this medium. In fact, he felt his views actually explained learners' motivations and attention when learning with computers, that is, learning via the "Nintendo Effect."

One does not need to observe children playing video games very long to observe that there is an inherent interaction of the learner with the machine which stimulates motivation. That is, because of the constant stream of rewards for correct or appropriate responses, the nature of the computer itself provides stimulus and response to encourage additional interaction. (Perry, 1997)

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Constructivist Learning and WBT

ontimetraining.com *courses are designed to encourage learners to discover principles by themselves. Information is appropriate to the learner's current knowledge level. Sequencing of material is paramount, and curriculum is organized in a spiral manner so that the learner continually builds upon what they have already learned.*

Although Behaviorism has clear and undeniable applications in many learning experiences, it does not sufficiently explain the nuances of learning that are primarily self-paced and self-direct-ed. A more useful theory to consider is Constructivism. It's a simple idea really. Constructivist theories tell us that learning is an individualized process of "constructing" knowledge, much like the layers of knowledge that bring the engineer from the childhood skills of building towers from wooden blocks to designing massive skyscrapers. The theory posits that knowledge and under-standing are built up, step by step, through active involvement of the learner. The imagery might be one of layers or spirals or more complex geometric designs, but the process of learning itself is simply one of constructing meaning from information in terms of what one already knows (Byrnes, 1996; Winn, 1997). In short, learning is a continuing process in which the individual builds on previous knowledge, reconciles new information with old knowledge, and rearranges knowledge to gain new perspectives.

Based on this theoretical point of view, **ontimetraining.com** courses are designed to encourage learners to discover principles by themselves. Information is appropriate to the learner's current knowledge level. Sequencing of material is paramount, and curriculum is organized in a spiral manner so that learners continually build upon what they have already learned. But learning is also a matter of recognizing relationships, and this is where hyperspace effectively supports and

enhances the learning experience, providing a variety of ways of looking at the same information, leading to a deeper understanding of content.

Because learners construct their own understanding of content, testing or assessment of the learner most often focuses on the "application" of knowledge rather than on how much or how little information has been received. For example, following the Constructivist model of a spiraling learning experience, **ontimetraining.com** learners use the knowledge they have acquired immediately. Interactive self-assessments, applied exercises, and guided scenarios incorporated frequently in course modules prepare learners to build on the next level of knowledge. "Testing" then becomes an ongoing process in which the learner participates and from which the learner constructs knowledge. (Note: In **ontimetraining.com** training, this Constructivist self-testing process is supplemented by the *ontimetraining Assessment Manager*, which controls and documents more traditional, Behaviorist-informed testing processes.)

Clearly, this type of courseware differs significantly from the traditional paradigm of teacher as lecturer. But without question, there is a place for that kind of instruction in **ontimetraining.com** courses as well. Certain learning scenarios call for uniformity in learning outcomes, and there are numerous disciplines that require right answers and correct procedures. For example, in training designed to prepare managers to maintain legal compliance with Federal guidelines, the Constructivist approach is effectively blended with the expertise of an instructor (a subject matter expert or SME) who designs boundaries for self-directed learning and interacts with learners through both synchronous and asynchronous web tools.

The three basic characteristics of hypermedia—interactivity, links, and browsing—seem tailor-made for courseware based on Constructivist theory. But they can detract from the learning process just as well if not properly used. For instance, too much interactivity overwhelms, too little turns WBT into online textbooks, and unguided "surfing" or browsing in unfamiliar territory often leads nowhere. At **ontimetraining.com**, instructional designers work to achieve the balance that leads to effective learning.

WBT and the Adult Learner

Adults tend to learn best when in an interactive setting where they can demonstrate current knowledge, but where they can also see the immediate relevancy of the information. Learning becomes a means to an end, not an end in itself. And adults need the opportunity to integrate new ideas with what they already know if they are going to keep (and use) the new information.

Behaviorist viewpoints may contribute to computer-based learning that involves simple declarative knowledge or objective response, but it doesn't go very far in explaining how people acquire more complex knowledge such as problem-solving and critical-thinking skills. Constructivist theories move us a bit closer to those explanations, as do social learning theories and adult learning theories. The latter go by the rather esoteric name of andragogy—adult education theory (as contrasted with pedagogy or childhood education theory).

The theory and instructional design that andragogy supports fits well with methods of computer-based and web-based learning. In the first place, WBT (at least in the case of the workplace) is the exclusive province of adult learners. But more importantly, adults bring very different things to the learning process than do children, and these skills and experiences speak to the very nature of WBT. Children are dependent, adults are more self-directing. Children expect answers to come from outside sources; adults expect to answer at least part of their questions from their own experiences (Laird, 1985). Additionally, adults display a more intrinsic motivation, their learning needs are immediate, and they have more of a problem-centered orientation to learning (Knowles, 1970).

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ontimetraining.com *responds to potential limitations of web-based instruction for adults.*

Caution	ontimetraining.com Solution
Information that conflicts sharply with what is already held to be true is integrated more slowly.	Provide information in small modules, building slowly towards the learning goal.
Information that has little "conceptual overlap" with what is already known, is acquired slowly.	Provide information in small modules, supplemented with real-life examples in case studies, scenarios, and online discussions with other learners.
Fast-paced, complex or unusual learning tasks interfere with the learning of the concepts or data they are intended to teach or illustrate.	Interactive exercises are constructed to be easy-to-use, even for learners who have limited technological skills.
Programs need to be designed to deal with viewpoints from people in different life stages and with different value "sets."	Interactive discussions with other learners in news groups and chat rooms expose learners to many viewpoints.
Self-direction does not mean isolation.	Learners are part of a larger learning group encountered in both synchronous and asynchronous forums.

The last point speaks to the importance of collaborative learning in adult WBT, which may seem lost when the learner is removed from the classroom. Observational or social learning theory posits that much of learning takes place through modeling or observing the behavior of others and the positive or negative consequences of that behavior. We learn not only from teachers, but from co-workers, bosses, important figures, even from our children. In turn, we are models of learning (for good or ill) for those with whom we interact. Because WBT can isolate the learner in a human-computer interaction, **ontimetraining.com** enhances collaborative learning through a number of venues that connect the individual to the outside world of instructors, peers, mentors, and even subject-matter experts. Collaboration through e-mail, discussion forums, and chat rooms often, in fact, exceed the benefits of classroom interaction because it allows for both one-on-one interaction with instructors, peers, mentors, and subject-matter experts, and for reflective time to compose questions, responses, and creative ideas

One of the by-products of **ontimetraining.com** WBT, especially for the adult learner, is freedom from the traditional classroom situation that can often be intimidating. "Self-esteem and ego are on the line when adult learners are asked to risk trying a new behavior in front of peers and cohorts. Bad experiences in traditional education, feelings about authority and the preoccupation with events outside the classroom affect in-class experience" (Zemke & Zemke, 1984). The very "democratic" nature of the web puts many of those fears to rest.

The use of graphics, color, animation, sound, video, and simulation can gain attention, but they won't sustain it. So ontimetraining.com curriculum designers have adopted a systematic model for addressing motivation not only at the outset, but through the entire design process.

Practical application of learning theory for web-based training takes place in the instructional design process. Here techniques and methods are developed for defining what is to be learned, for designing instructional strategies, for developing content, for selecting the best media, for delivering instruction, for tracking learner progress, and for measuring outcomes. Most instructional models follow a generic pattern of analysis, design, development, implementation, evaluation, and revision. These models represent a systems approach to instruction and have evolved through a mix of practice, on-the-ground research, and theory (Seels & Glasgow, 1996).

Many designers work hard at grabbing the user's attention, to such an extent that media choices sometimes determine instructional design rather than enhancing it. The use of graphics, color, animation, sound, video, and simulation can gain attention, but they won't sustain it. So **ontimetraining.com** curriculum designers have adopted a systematic model for addressing motivation not only at the outset, but through the entire design process. Adapted from the ARCS Model of motivational design, the **ontimetraining.com** design approach consists of four main strategies: **A**ttention strategies for inspiring learner interest and curiosity; **R**elevance strategies that show learners the relationship between the training and their needs; **C**onfidence strategies that help students learn to expect a successful training experience; **S**atisfaction strategies that provide reinforcement for learner's efforts (Small, 1997).

How do these strategies really impact **ontimetraining.com** courses? Opening pages are visually eye-catching, but learner attention is more effectively held through thought-provoking problems or issues. The user recognizes immediately that he or she is an active participant in the learning process and that the content is relevant in the context of previous learning experiences (i.e. Constructivist knowledge building). Users are led to feel confident that they can learn the material and are offered frequent opportunities to feel a sense of satisfaction and accomplishment by completing performance exercises, tests, and skill assessments.

Once you've gained their attention, then the question becomes; What is the optimal sequencing of a lesson or course to ensure effective, theory-based learning? One of the more frequently referenced start-to-finish lesson models is that presented by Robert Gagne in his work *The Conditions of Learning* first published in 1965 and revised through 1985 (Gagne, 1996; Zemke, 1999). These types of lesson models really fit within larger instructional design frameworks that provide sequencing guidelines from problem analysis through courseware evaluation and revision. Intermediate steps include assessing learners and setting goals, design and development of content, computer implementation of the courseware, and refinement based on quality checks and user feedback. At **ontimetraining.com**, we have applied this useful model as shown in the chart below:

ontimetraining.com's *adaptation of Gagne's instructional design framework.*

Gagne	ontimetraining.com
Gain attention and describe the goal.	Explain objectives and benefits of instruction.
Stimulate recall of prior knowledge.	Conduct "pre-assessment" by inviting learner to consider and share relevant experiences.
Present the material to be learned.	Provide a consistent format broken down into individual components.
Provide guidance for learning.	Information on how to learn the content: interactive cues, tips, SME feedback.
Elicit performance.	Continued transitional practice or problem solving that will gradually increase in complexity.
Provide informative feedback.	Information on how to better learn the content: interactive cues, tips, SME feedback.
Assess performance.	Final performance or skills assessment based on stated task and learning objectives.
Enhance retention and transfer.	Course remains available for review of lesson, interactive forums, and application to real-life situations.

Conclusion

We shouldn't be too "wowed" by "stuff that moves." It's the outcomes that we seek, and the means (learning principles) should always justify those ends.

Today's workers must be committed to continuous learning and must be ready to "reinvent" themselves to keep pace with change. The information era rests on "knowledge-based" economies. Access to information, learning readiness, and the ability to transfer knowledge to real-life situations have become prerequisites to success in the 21st century. The immediacy of web-based training speaks to the times. But we shouldn't be too "wowed" by "stuff that moves." It's the outcomes that we seek, and the means (learning principles) should always justify those ends.

The benefits of technology—the media displays, the interactivity, the information linkages, and browsing—are considerable, but are only realized through setting goals, understanding learners' needs, and instructional design based on proven theory and practice.

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