

Corporate Learning in the Knowledge Age



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Chapter 1: Introduction

The American Society for Training & Development (ASTD) recently published definitive evidence that investments in workforce training directly impact a company's performance. The research shows a direct correlation between training and gross profit margins, total stockholder return, and price-to-book ratios (Details of the study are available at the end of this chapter). Mark Van Buren, Director of Research for the ASTD notes, "It is clear that a firm's commitment to workplace learning is directly linked to its bottom line - and investors, Wall Street, and financial analysts should pay attention."

Motorola claims a 30 to 1 return on training; in other words, for every \$1 it invests in training, the company gets back \$30 in productivity gains within three years.

-- Jim Harris - *Getting Employees to Fall in Love With Your Company*

As a manager, you already know training is important. And you've probably already discovered that technology-based training is much more cost-effective than the traditional classroom approach. In fact, you may already be using various forms of e-learning. You may have a corporate university or learning portal. You may even refer to your company as a "learning organization." But how effective is learning in your organization? Notice I said learning not training. It's easy to claim that people have been trained, but can you show that they actually learned?

Corporate Learning in the Knowledge Age is about the development of smart learning strategies that marry the most advanced knowledge research about adult learning with today's business realities and the promise of technology. The focus is on creating learning environments that actively involve and empower the learner.

Wills describes the optimum learning environment:

"The key [to learning] is presenting learners with a learning environment instead of just presenting them with information. A learning environment is one in which there is something for learners to DO: not an information system for browsing nor a drill and practice tutorial system for rote learning of simple facts but rather an active environment that involves the learner in a challenge and a mission."

S.Wills, *Beyond Browsing: Making Interactive Multimedia Interactive* (1994)

Chapter 1: How Adults Learn Best

We begin our journey with a review of how adults learn best. In this chapter, we look at the cognitive processes associated with learning, explore adult learning theories, and examine findings from several studies that score retention for different teaching and training methods. This chapter also includes tips for motivating learners, plus a review of Critical Learning Elements and an overview of experiential learning.

Chapter 2: Learning By Doing

In the second chapter, we delve deeper into experiential learning and show the use of interactive simulations in the transfer of knowledge. In keeping with what we showed you in Chapter 1 – that adults learn best by doing, we focus the second chapter on what “learning by doing” actually means and how it translates into practical learning tools. This chapter brings together results from a variety of studies and experts. We provide you with examples of how companies are using technology to enable experiential learning.

Chapter 3: Learning Styles

In Chapter 3, we look at learning styles. We review different types of learning styles models and methods and focus on work by David Kolb, Anthony Gregorc, and Barbara Solomon.

Chapter 4: The Promise of Technology

Chapter 4, The Promise of Technology looks at e-learning business drivers and the future of learning, according to futurist Richard Worzel. We review the benefits and advantages of technology-based learning. We’ll also look at how companies are using technology to enhance learning, and talk about what types of content are not suited for technology-based delivery. This chapter also provides a detailed list of questions that you can use to evaluate e-learning products and technologies.

Business Realities

Learning and knowledge management have become critical business issues. Authors of a recent study on e-learning suggest that “The organizations that will succeed will be those

that can obtain, manage, distribute and uptake knowledge the fastest and cheapest.”--
McCrea, Gay and Bacon, *Riding the Big Waves*, 2000.

The elevated importance of Learning and Knowledge Management is related to five key business realities:

1. Skills and knowledge have become a company's primary assets. As Larry Prusak says “The only thing that gives an organization a competitive edge –the only thing that is sustainable –is what it knows, and how fast it can know something new.”
2. Change is constant. Specific skills and knowledge quickly become obsolete. Skills and knowledge must continually be updated and refreshed.
3. Attracting and retaining key talent often depends on the training and development opportunities a company offers.
4. With the increasingly distributed and global nature of the workforce, learning and knowledge sharing become more important, and at the same time, more complex.
5. Traditional approaches to learning are cost-prohibitive and ineffective. Success in the Knowledge Age requires new learning models and effective use of technology.

"We are living through a transformation that will rearrange the politics and economies of the coming century. There will be no national products or technologies, no national corporations, no national industries. There will no longer be national economies. All that will remain rooted within national borders are the people who comprise a nation. Each nation's primary assets will be its citizens' skills. And those will depend above all else on the ability of a nation's population to learn those new skills, particularly in defining problems, creating new solutions and adding new values."
- *Former Secretary of Labor Robert Reich, The Work Of Nations.*

Training Investments Improve Company Performance

According to the American Society for Training and Development (ASTD), there is definitive evidence that investments in workforce training can predict a company's future financial performance, including its total stockholder return (TSR).

ASTD examined the average annual training expenditures of 575 companies. Those in the top half of the study group (who spent more on training) had an average TSR the following year of 36.9 percent, while firms in the bottom half had an average TSR of only 19.8 percent. (For comparison purposes, the S&P 500 had an annual return of 25.5 percent during this same period.) In other words, firms in the top half had a TSR that was 86 percent higher than firms in the bottom half, and a 45 percent higher TSR than the market average.

Taking other factors into account, ASTD found that knowing a firm's education and training investment improves the power to predict its future TSR by 50 percent. "It is clear that a firm's commitment to workplace learning is directly linked to its bottom line - and investors, Wall Street, and financial analysts should pay attention," said Mark Van Buren, Director of Research for ASTD.

ASTD researchers also found a similar pattern when looking at gross profit margin, income per employee, and price-to-book ratios. Firms in the top quarter of the study group who invested on average \$1,595 per employee in training experienced...

- 24 percent higher gross profit margins
- 218 percent higher income per employee
- 26 percent higher price to book ratios

...than firms in the bottom quarter who invested on average \$128 per employee.

"It is clear that firms' training expenditures positively affect other indicators that investors use to evaluate stocks," said Van Buren. "This information is powerful - investors and companies will both benefit by tracking and reporting on training expenditures."

Training Programs Help Attract & Retain Talent

Studies by Kepner-Tregoe, American Society for Training & Development (ASTD) and the Society for Human Resource Management (SHRM) all show training and career development among the top three reasons employees left companies and key reasons applicants choose one company over another.

In August 1998, the Gallup Organization issued a 182-page report entitled *Employees Speak Out on Job Training*. Results came from interviews conducted with 1000+ workers. The findings send a very clear message about the importance of training:

- The more training workers receive, the likelier they are to pronounce themselves satisfied with their employers.
- Eight employees in 10 cite the availability of employer-sponsored training as an important criterion in considering a new job opportunity.

Chapter 2: How Adults Learn Best

Howard Wactlar, Vice Provost for Research Computing at Carnegie Mellon suggests:

- We obtain 80% of our knowledge visually, but retain only about 11%.
- We acquire a smaller percentage through hearing, but remember more of it.
- When we combine both visual and auditory, we can increase retention to 50%.

Colin Rose and Malcom Nicholl in *Accelerated Learning for the 21st Century* suggest that the key to learning is to combine seeing, hearing, saying and doing. Rose and Nicholl claim that we remember:

20% of what we read
30% of what we hear
40% of what we see
50% of what we say
60% of what we do
90% of what we see, hear, say and do

Studies by the National Training Lab maintain that audio-visual accounts for only 20% retention, while demonstrations and discussion can bring retention up to 50%. They

maintain that the real *bang for the buck* comes by adding interactivity and practice, which results in 75% retention. Teaching others offers the highest retention at 90%.

THE LEARNING PYRAMID

National Training Laboratory research shows the following average retention rates for different teaching and training methods:

5% Lecture
10% Reading
20% Audio-Visual
30% Demonstration
50% Discussion Group
75% Practice by Doing
90% Teaching Others

The common theme in all these studies is that simply reading about or listening to a lecture on a subject is not an effective way to learn. Even adding audio-visual bells and whistles is not sufficient. In order for learning to really be effective – in order to achieve higher retention rates – the learner has to be actively involved in the process. Interaction is key to learning.

Higher retention puts a higher value on every dollar spent on training.

The problem with traditional learning is that it's mostly a "learn about" approach. We learn about running a business, we learn about solving a problem. But we don't actually do anything with what we learn. Alan Webber of *Fast Company* brings home the problem in his article "Why Can't We Get Anything Done?"

"Ask yourself this question: Would you undergo heart surgery if the surgeon had been trained in the same way that business-school students are trained? Imagine that the surgeon had sat around in medical school discussing heart surgery, watching heart surgery videos and listening to other heart surgeons talk about what they did – and now you're lying on the operating table, that surgeon's first real patient. Would you actually let that surgeon cut you open? I don't think so!"

The Process of Learning

Though we often view learning as a one-shot event, it is actually a process involving three steps:

1. Acquisition (How do I get it?)
2. Retention (How do I keep it?)
3. Application (What do I do with it?)

The first step, acquisition, is where we make a decision (whether recognized or not) to seek new information and attempt to integrate it into our own unique situations.

In the retention stage we focus on how to keep the knowledge we've acquired. In traditional educational programs, retention is THE primary focus – retention via memorization. Today we find that we are far better served to focus on access and the skills and ability to FIND what we need when we need it, rather than retention. Why try to house all that information in your brain if you can access it faster and easier from some place else?

Application is using or applying the knowledge. Application means action. It's taking the test drive. Sometimes, we are able to use our new skills immediately; more often than not, it takes many repetitions and adaptations of what we originally learned for us to display new abilities.

In the best of all circumstances, acquisition, retention and application of new knowledge occur simultaneously. This saves time in the learning process and produces more effective results. Imagine if you had been able to immediately apply what you had learned in school. How much more of the information and knowledge do you think you'd have available for use today?

Technological advancements can help us make "learning while doing" a reality. Now we have tools that will teach, allow us to try out our new skills, and monitor our progress all at the same time.

Adult Learning Theory

Eduard C. Lindeman's *The Meaning of Adult Education*, published in 1926, laid the foundation for a systematic theory of adult learning. Influenced by the educational philosophy of John Dewey, Lindeman maintained that experience was the best teacher and that "the approach to adult education will be via the route of situations, not subjects."

Lindeman felt that conventional education had it backwards with subjects and teachers at the starting point. He maintained that adult education begins when the adult person finds himself in specific situations with respect to this work or life – situations that call for adjustment.

"My conception of adult education is: a cooperative venture in informal learning, the chief purpose of which is to discover the meaning of experience; a quest of the mind which digs down to the roots of the preconceptions which formulate our conduct; a technique of learning for adults which makes education coterminous with life and hence elevated living itself to the level of adventurous experiment."

--Lindeman 1926

Lindeman's key assumptions about adult learning are listed below. They have been supported by later research and constitute the foundation of adult learning theory (Knowles, 1973).

Lindeman's Key Assumptions About Adult Learners

1. Adults are motivated to learn as they experience needs and interests that learning will satisfy.
2. Adults' orientation to learning is life-centered.
3. Experience is the richest source for adults' learning.
4. Adults have a deep need to be self-directing.
5. Individual differences among people increase with age.

SOURCE: (Lindeman, 1926)

How does that translate into practice?

In order to support the assumptions listed above, learning must:

- Be available on demand, just-in-time, when and where the learner is most comfortable
- Build on the learner's past experience
- Be learner-controlled and self-paced
- Support different types of learners and learning needs

Critical Learning Elements

1. Relevance

To commit information to permanent memory requires that learners understand its relevance – it's relevance to their work, and it's relevance to them personally.

People need a business reason to learn. It is not enough that they are emotionally open to the idea; they need to be pushed. Programs have to impart the WHY.

Adults are motivated to learn to the extent that they perceive that learning will help them perform tasks or deal with problems that they confront in their life situations.

Furthermore, they learn new knowledge, understanding, skills, values, and attitudes most effectively when they are presented in the context of application to real-life situations. – (Knowles 1973).

Adults need to know why they need to learn something before undertaking to learn it. Tough (1979) found that when adults undertake to learn something on their own, they will invest considerable energy in probing into the benefits they will gain from learning it and the negative consequences of not learning it. (Knowles, 1973).

“Turning facts into personal meaning is the central element in learning. Information communicated as facts loses all its contexts and relationships, while information communicated as art or as experience maintains and nourishes its connections.” (Laurel, 1991).

2. Situatedness

Lave (1991) argues that learning is a function of the activity, context, and culture in which it occurs (i.e. it is situated). This contrasts with traditional learning which involves knowledge which is abstract and out of context. Situated learning is often unintentional, rather than deliberate. Interaction is a critical component.

A situated learning environment reproduces the technological, social, time, and motivational characteristics of real world situations where what is being learned will be used. It is only through encountering subject matter knowledge in context that students will learn when, where, and how the knowledge applies to other situations. (Lave, 1991)

Knowledge is not something that is stored in the brain. Knowledge is created in a situation, and is never used again in exactly the same way.

--Maarten Sierhuis

3. Learner-controlled

Traditional learning models view the learner as a passive recipient of instruction. The instructor makes all the decisions about what will be learned, how it will be learned, when it will be learned, and if it has been learned. In the new model, the learner is in control of his or her learning and actively involved in the learning process. The role of the instructor

becomes one of facilitator or coach rather than information giver and assessor. Instructional methods encourage exploration and discovery, while offering hints, feedback, and reminders as learners learn to carry out tasks; and fade, gradually handing over control of the learning process to the learner.

This paradigm shift is from one of an *instructivist* philosophy where the goals and objectives of the learner exist apart from the learner to a *constructivist* philosophy emphasizing the importance of the learner's intentions, experience and metacognitive strategies. (Reeves, 1998).

Although it is out of necessity that we replace instructor-controlled models with learner-controlled models, studies have shown that this model results in much more effective learning and increased retention.

As individuals mature, their need and capacity to be self-directing, to use their experience in learning, to identify their own readiness to learn, and to organize their learning around life problems increases.

-- Knowles, 1973

Why the old model doesn't work.....

Sue Berryman describes why the "passive" model is not effective:

Control over learning in the hands of the teacher undercuts the student's development of cognitive management skills, including goal-setting, strategic planning, monitoring, evaluating, and revising--capabilities critical for effective learning. Students develop no confidence in their own ability to learn or in their own sense-making abilities, and their opportunities to learn from experience are highly constrained. Another consequence of passive learning is that since students are not drawn into the learning process, they adopt a "waiting-it-out" attitude, investing minimal attention and involvement in the learning process. Passive learning thus encourages "veneers of accomplishment"--changes in ways of talking, but not in behavior. (Berryman).

Corporat

The minute adults walk into an activity labeled "education," "training," or anything synonymous, they hark back to their conditioning in their previous school experience, put on their dunce hats of dependency, fold their arms, sit back and say "teach me."

--Knowles (1973)

4. Individualization

Learning and delivery of knowledge should be tailored to the individual in terms of learning style and learning needs. Programs should be able to assess where the learner is (i.e. the knowledge they already have) and customize the presentation of instruction to correspond to the learner's level of knowledge.

5. Multi-Sensory

We learn best what we feel most. Emotions and cognition cannot be separated (Ornstein, 1987). Emotion plays a key role in learning, thanks in part to the way we're wired. There are more neural connections going from the limbic emotional center to the intellectual cortex than vice versa. So emotion is often a more powerful factor in influencing behavior than is logic. (Rose. P.51)

The best learning programs are multi-sensory. Daniel Goleman, in *Working with Emotional Intelligence*, notes "Activities that engage all the senses and that are dramatic and powerful can be especially effective."

Direct, multi-sensory representations have the capacity to engage people intellectually as well as emotionally, to enhance the contextual aspects of information, and to encourage integrated, holistic responses." (*Laurel, p.119*)

Wills describes how the best programs affect us at a very profound and emotional level.

"The program should enter and occupy a place in our hearts; there should be an emotional richness that speaks to our human caring. These can provide a unifying framework for a program's concepts and, at the same time, *hook* the user into the program and its reality, lend an irresistible thrust to the action that keeps the user involved and in his or her seat, and bring a sense of resolution and closure at the program's ending. The user perceives a sense of unity in the

program, that can satisfy at several levels. A result can be an educational experience that is in many ways equivalent to a *life experience*, affecting the learner at a profound level." (Wills pp. 73 - 74)

6. Accommodates Complexity, Uncertainty & Ambiguity

The world is becoming increasingly more ambiguous and uncertain. The traditional focus on "one right answer" is no longer meaningful. It is critically important that workers develop and continually hone critical thinking and decision making skills and practice using these skills in real-world situations.

Tomorrow's successful employees will have to be problem solvers, decision makers, adept negotiators, and thinkers who are at home with open-endedness, flexibility, and resourcefulness. They must be able to deal with uncertainty, complexity, the global village, the information explosion, other technologies, and many different cultures – and still maintain a set of values that foster an adequate degree of individual stability, integrity and social harmony."

-- *Making Connections, Teaching and the Human Brain*, Renate Caine and Geoffrey Caine, 1991.

Ellen Langer in *Mindful Learning* suggests teaching "conditionally" so that learners will be able to use the learning in a variety of situations. She maintains that "the key to the new way of teaching is based on an appreciation of both the conditional, or context-dependent, nature of the world and the value of uncertainty. Teaching skills and facts a conditional way sets the stage for doubt and an awareness of how different situations may call for subtle differences in what we bring them."

Much of the technology enabled training available today is based on behavioral psychology using the fact-question-feedback model which reflects the educational theories of Socrates and Skinner. The learner is told or shown information then tested or questioned. There is little or no interaction or involvement. Knowledge is framed in black and white, allowing for no shades of gray. This model is not suitable for the complex realities of business training. (Wills, 1994)

7. Practicing & Demonstrating Competency

Regardless of learning style or subject matter, all people learn best by doing – by practicing, by demonstrating competencies, by applying learning in new and different ways.

Roger Schank notes the reason learning by doing works is that “it strikes at the heart of the basic memory processes upon which humans rely. We learn by experiencing, by integrating new experiences into our existing memory structures. When new data is simply told to us, we don’t know where in memory to put it. Context (the real world situation) provides the essential components that enable us to integrate (i.e. store) the knowledge / experience and retrieve it for later use.” (Schank, 1997).

Learning should be staged so that the learner builds the multiple skills required in expert performance and discovers the conditions under which they apply. This requires a sequence of increasingly complex tasks, increasingly diverse problem-solving situations, and the staging of learning so that students develop a feel for the overall terrain before attending to details.

8. Making Mistakes in a Safe Environment

Research suggests that not only is “doing” important, but failing, then trying again is equally important. Roger Schank says that “People learn by experiencing failure.” This is due in part because they learn from having to explain (Schank, 1986), and the need to explain arises only when something unexpected happens. A good learning environment puts students into situations where they can encounter failures in a safe and protected environment. Alan Webber suggests that companies who want to move from knowing to doing “need to build a forgiveness framework – a tolerance for error and failure – into their culture.”

Nothing anyone says, no matter how eloquent or insightful, will do any more than inspire you. You must internalize procedures to do a better job. To do this you must try them out and receive help when you fail.

Corporate Learning -- Roger Schank – *Virtual Learning*

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9. Transferable Skills

An important concern for educators and trainers is the degree to which learning transfers to real, external situations – in other words, whether the learner is able to apply the learning in new situations. The cognitive theories of Newell and Simon (1972), Anderson (1983), Brown (1985), and others support the fundamental principle that the way in which knowledge, skills, and attitudes are initially learned plays an important role in the degree to which these abilities can be used in other contexts. To put it simply, if knowledge, skills and attitudes are learned in a context of use, they will be used in that and similar contexts.

Characteristics of an Effective Learning Experience

Peter Vaill in *Learning as a Way of Being* notes the results of 1992 study where HR professionals were asked to answer the question: Think of someone whose learning you care a lot about and suppose that they are about to undergo a major learning experience. What characteristics would you want this experience to have for them? Responses are shown below.

- Freedom to question or disagree.
- Learners have fun in the process.
- What is learned is reinforced.
- The experience meets individuals' needs.
- Participants use their own experiences to learn.
- Instructors have a genuine concern for learning.
- Learning is self-paced.
- Subject matter is interdisciplinary.
- Curiosity is encouraged and rewarded.
- There is no doctrine of one right way present either in what or how to learn.
- A variety of learning sources are used.
- There is cultural diversity among learners.
- A non-judgmental climate exists.
- There is tolerance for mistakes.
- The climate fosters creativity.
- Everyone is stretched out of his or her comfort zone.
- Learners have time to reflect.
-

Motivating Learners

In their book, *Technology-Based Training: The Art and Science of Design, Development and Delivery* (Josey-Bass, 2000), Kevin Kruse and Jacob Keil describe the four-step model for motivating students, developed in 1987 by John Keller and T.W. Koop. The four components are:

Attention. The most important goal is to get and keep the learner's attention. Strategies for gaining attention include sensory stimuli, inquiry arousal (thought-provoking questions) and variety (variation in exercises and use of media).

Relevance. Attention and motivation will not be maintained unless the learner believes the training is relevant. Benefits to the user (What's in it for me?) should be clearly stated in both the content and any course marketing materials.

Confidence. If students feel they are incapable of achieving the course objectives or that it will take too much time, their confidence will be undermined and their motivation will decrease. They should be given an estimate of the time required to complete lessons, or a measure of their progress throughout the program.

Satisfaction. Learners must obtain some type of satisfaction or reward from the learning experience. This can be in the form of entertainment or a sense of achievement. A self-assessment game, for example, might end with an animation sequence acknowledging the user's high score. Or a passing grade on a post-test might be rewarded with a completion certificate. Ultimately, of course, the best way for learners to achieve satisfaction is to find their new skills immediately useful in the job.

Learning Principles

Taken from the Edina Public Schools Mission Statement (Edina, Minnesota)

- Every person can learn.
- Individuals learn at different rates and in different ways.
- Technology-enabled learning should accommodate different learning styles and personalize learning to individual learners.
- Learning is a lifelong process
- Every person wants to do a good job.
- Self-esteem affects learning; learning enhances self-esteem.
- Global awareness and understanding are essential components of learning

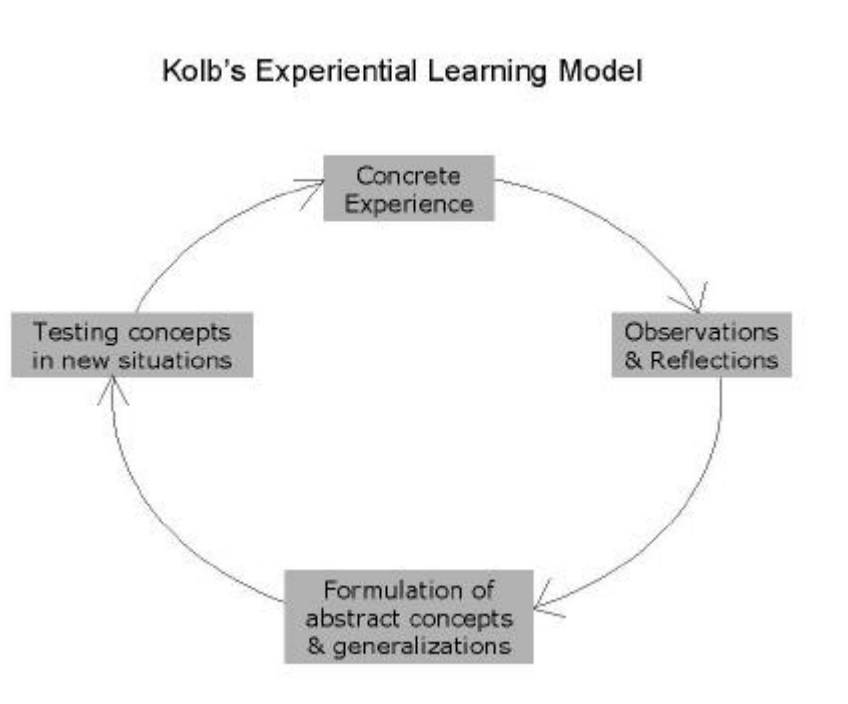
The Basics of Experiential Learning

We have plenty of evidence to support the value of experience-based learning. The fundamental lesson in adult learning is participation – learning by doing. Experiential learning models, such as those developed by Kolb, offer a sound framework for the development of quality learning programs.

At the heart of all experiential learning is the belief that learning occurs when an individual is actively involved with concrete experience (Walters & Marks, 1981). Hoover and Whitehead (1975) define **experiential learning** as existing “when a personally responsible

participant cognitively, affectively, and behaviorally processes knowledge, skills, and/or attitudes in a learning situation characterized by a high level of active involvement." Experiential learning is learning while doing.

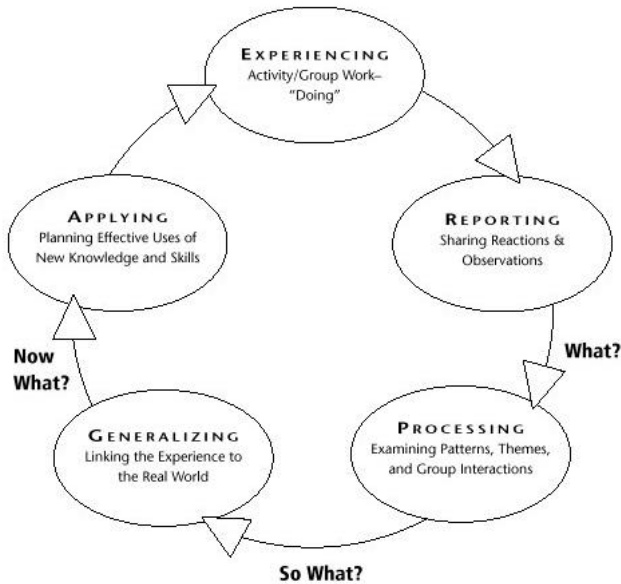
Although there are numerous models and theories of experiential learning, Kolb's experiential learning model is the most popular and most frequently referred to. Kolb defines experiential learning as a "process whereby knowledge is created through the transformation of experience." (1984). It is this process, not specific outcomes, and the mechanisms that transform experience into knowledge that interest Kolb and are illustrated in his model.



Kolb begins with concrete experience (CE) that motivates the learner to reflect on that experience (RO). Reflection then leads to the testing of existing concepts and the formation of new ones from which learners make sense of their world (AC). Learners then test these concepts by actively experimenting with their world (AE), which begins the cycle once again (CE) but now from a newer perspective, modified by what has been learned.

A Training Guide from the US government's Health & Human Services organization describes a similar experiential learning model.

The Experiential Learning Cycle



1. **Experiencing:** Participating in an activity designed to produce information or understanding — to identify, explore, examine, or study a problem, topic, or issue and generate a common base of knowledge for the steps which follow. Experiencing can lead to a sense of discovery. Experiences can be individual, small group, or full-group based.
2. **Reporting:** Sharing the experience, reporting reactions and observations. Members discuss "What happened?" and "How did it go?"
3. **Processing:** Systematically examining and analyzing the shared experience, looking for patterns, themes, relationships, and group interactions. Members discuss "What kinds of things happened and why?"
4. **Generalizing:** Linking or extrapolating the experience to the real world, by identifying useful concepts or approaches. Generalizing answers the question "So what?" or "What can we do with this?"
5. **Applying:** Using the new information and skills in real-life situations. This can be done through planning and discussing how to apply what was learned, role-playing its use, or actually putting it to use through interactive simulations.

Chapter 3: Learning By Doing

Combining Technology & Experiential Learning

It's true, experience is the best teacher. We learn best by taking action and seeing the consequences of our actions. The dilemma, as Peter Senge explains in *The Fifth Discipline*, is that "we learn best from experience but we never really directly experience the consequences of many of our most important decisions."

That's where technology comes in. Technology-enabled simulations allow individuals to experience realistic situations that they will encounter within their work environment, to take actions, and to see the results of their actions.

Technology-enabled experiential learning or simulations have the power to present a wide variety of relevant situations within a compressed time period. A single simulation program can enable learners to experience on-the-job situations that might typically take an individual several weeks, months or even years to experience in real time.

One of the best ways to develop and reinforce knowledge transfer is by replicating real life experiences. Unfortunately live simulations have drawbacks. In addition to the very high cost, classroom simulations are one-time events that once completed, are incapable of offering any lesson reinforcement or support. As a result, computer-based simulations have become increasingly popular with applications ranging from war games simulations for the military to situational leadership scenarios for corporate managers.

--McCrea - "Riding the Big Wave" 2000.

Learning Through Simulated Experiences

Simulations represent *experience* as opposed to *information*. Learning through direct experience has, in many contexts, been demonstrated to be more effective and enjoyable than learning through 'information communicated as facts.' Direct, multi-sensory representations have the capacity to engage people intellectually as well as emotionally, to enhance the contextual aspects of information, and to encourage integrated, holistic responses." (Laurel, 1991)

(Cadotte, 1995) notes that many business simulations provide students with the closest

experience to a "real-life manager's role with its focus on execution, budgets, and cash flows that are continuous and driven by deadlines."

Simulations allow learners to explore how key variables interact and affect performance. In the context of business education, simulations are generally defined as "a sequential decision-making exercise structured around a model of a business operation in which participants assume the role of managing the simulated operation" (Greenlaw, Lowell, & Rawdon, 1962). Simulations often capture the complexity of reality with its overlapping decisions, deadlines, and financial constraints.

Today's information technology (computers, wide-area networks, videodisks, and multimedia) are all contributing to the realism and the spread of experiential learning via simulations in business education (Gunz, 1995).

Simulations have proven especially effective for helping employees develop affective skills such as the development of sensitivities to cross-cultural issues. (Kolb & Lewis).

Because simulations generally require a set or series of decisions, they permit multiple iterations on the part of learners (Graf & Kellogg, 1990), which result in a more detailed understanding of the variables that impact outcomes. Simulations also permit more varied multitasking on the part of learners.

Simulations are effective because.....

1. Simulations are effective because they provide the critical component of context. To teach a skill one must teach it within a relevant context.
2. Simulations are effective because they provide a safe way for people to try something, fail, get feedback and try again. This is essential to learning.
3. Simulations meet the needs of Adult Learners, who would rather learn through practical experiences and hands-on applications using what they already know and building new knowledge and skills from their current platform of understanding.
4. Although organizations learn best from experience, most organizations rarely experience the consequences of many of the most important decisions they make. Simulations enable organizations to see the consequences of decision-making.

Choose the Right Subject to Simulate

Some subjects lend themselves better to simulation than others. R. Garry Shirts of Simulation Training Systems suggests a topic is more apt to be suitable for simulation if it embodies at least one of the following characteristics:

- **Seeing the world through other people's eyes.**
Simulations and role play are an effective means of helping learners get a feel for what it's like to be in someone else's shoes. Customer service reps, for example role-play customers and developers to understand their perspective.
- **Performing tasks simultaneously.**
Traditional training methods teach skills in a linear fashion, one by one. In the real world, skills are often needed in clumps: A manager may find herself simultaneously negotiating with a vendor, listening to a customer complaint and planning the response to a memo from her boss. A simulation can create an environment in which she learns to do all three and more at once.
- **Performing under pressure.**
Some people are skillful negotiators, excellent listeners, clear direction givers – but only when they don't have to perform under pressure. Simulations can create environments full of genuine but non-threatening pressure, affording such people opportunities to practice their skills under duress.
- **Developing systems thinking.**
A simulation can put people inside a system. As part of the system, they see firsthand how a change to one component affects the others.
- **Recognizing cognitive dissonance.**
People often hold contradictory attitudes or beliefs without being aware of the contradiction. This is known as cognitive dissonance. For instance, if a manager sincerely believes she is nonsexist yet behaves in a sexist manner, chances are she suffers from cognitive dissonance. A simulation can call her attention to it in a safe and non-threatening environment.

How are companies using Simulations?

AMR's Sabre group uses CD-ROMs to simulate procedures such as checking luggage through airport X-ray machines. (*CIO Magazine*, 1997).

Through the use of advanced simulators, Burlington Northern Railroad, in Fort Worth, Texas, has boosted its training productivity by 15 percent per year and improved quality, according to Edward Butt, assistant Vice President of Technical Training. In the past, new engineers had to spend most of their training time in locomotives, which presented logistical challenges and limited the range of experiences encountered during training. Now, with images generated on Silicon Graphics workstations and a program from Hughes Electronics, engineers experience a full range of real-world scenarios, including emergencies and varying weather conditions. (*Byte*, 1995)

Boston Chicken trainees practice ringing up orders on a simulated cash register in order to become faster and more accurate. They are able to learn in a safe, engaging environment, where they are helped by an online tutor.

Call centers representatives are using simulations of customer calls to learn how to respond to customers and improve their ability to think, listen, talk, type and e-mail at the same time.

Andersen Consulting uses business simulation programs developed by Roger Schank's Learning Sciences Company to teach new consultants basic business skills, such as cash flow planning and market analysis. One part of the simulation, for example, is about human resources. During the simulation the user becomes the HR person for Perrin Printing and Publishing, with responsibilities including hiring and firing, pay increases, counseling and other managerial tasks. The simulation "lasts" 48 months, and during that time the user is faced with mind-boggling array of issues, decisions and consequences:

- Users have to decide who to send to a training program, and if they make the wrong decision, they could cause morale problems.
- Users have an employee who's a nice guy but can't seem to become productive, even though users try a number of approaches. The users fire him and are faces with a wrongful discharge suit.

- A department supervisor suddenly retires and users don't have anyone ready to take her place.

The simulation keeps throwing situations at trainees, asking them to make decisions as month after month goes by. The consequences of those decisions are played out on the computer screen, and all sorts of real-life consequences happen – users get reprimanded, commended or fired. As the scenario unfolds, people appear on the screen in videotaped form to tell users stories related to the decisions they're facing.

Low-Tech Simulations

These excerpts from *IncMagazine's* Psychodrama Sessions (April 1997) provide examples of how companies are using role-play and simulation in a low-tech or no-tech approach.

Stan Frankenthaler, chef and president of Salamander Restaurant, in Cambridge, Mass., brings an element of the theater to his ongoing training sessions. Once a week the waitstaff at the business act out scenarios such as medical emergencies and computer breakdowns. "Verbal instructions are often hit-or-miss," says Frankenthaler, whose restaurant reported more than \$2 million in 1996 sales. "When the staff is actively involved in training, the lessons are more long lasting." Another payoff: group participation fosters camaraderie.

Mark Leavitt, president of MedicalLogic, in Beaverton, Oreg., uses skits to train not only employees but also customers. MedicalLogic, a \$10-million company that makes electronic-medical-records software, holds half-day "clinic work-flow simulations." Groups of new employees (or a new client's medical-office staff) take turns playing doctor (or patient or receptionist) and responding to various illustrative crises. Leavitt says customers are better prepared for their first day with the system "because they've been through it before." Armed with a feel for medical-clinic life, employees can better design, sell, and service the product.

Using Simulations to Teach Managers How to Diffuse Anger

Another application of action methods in business settings is in helping companies to prevent violence in the workplace. With homicide being the third leading cause of deaths on-the-job, companies are proactively giving increased attention to their responsibilities for identification and prevention. This involves, in part, more training of their supervisory and management staff. Successfully defusing situations involving worker anger escalation is one very significant means of reducing the risk of violence. Action methods are especially well suited to help supervisors learn skills they can apply on-site for handling angry co-workers.

In training sessions, an anger escalation model is first presented, describing several stages of anger escalation, together with visible body cues to be observed for each stage. Psychodramatic mirroring and behavioral modeling greatly facilitate participant learning of the different stages. Supervisor responses are developed and rehearsed for each of the stages, with the belief that a successful intervention is one that prevents the angry worker from escalating to the next level.

Alternatively, re-creating actual workplace situations, using auxiliaries to take the part of known company staff members greatly adds to the immediacy and impact of the training sessions. Using action methods to train supervisors leads them to come away from the sessions with experience and the confidence of having successfully de-fused an anger situation BEFORE being called upon to do so out on the work site floor.

The Importance of Situational Context

Lave (1991) argues that learning is a function of the activity, context, and culture in which it occurs (i.e. it is situated). This contrasts with traditional learning which involves knowledge which is abstract and out of context. Situated learning is often unintentional, rather than deliberate. Interaction is a critical component.

Studies suggest that situational contexts have a tremendous influence on performance. Carraher, Carraher and Schliemann (1985) studied a group of Brazilian street children who were under great pressure to form a successful street business. If they didn't succeed they risk death at the hands of the death squads. The researchers found that the same children who are able to do the mathematics needed to run their street business are often not able to do similar mathematics in school. In fact, the more abstract and removed from real world contexts the problems are in their form of presentation, the worse the children do.

Such differences are not limited to Brazilian street children. Lave (1988) showed that Berkeley housewives who successfully did math for comparison shopping, were unable to do the same mathematics when placed in a classroom with problems presented in abstract form. Ceci and Liker (1986) studied men who successfully handicapped horse races. They found that the skills were quite specific to the situation. The same men could not successfully apply their skills to computations involving securities in the stock market.

In other words, their problem was not at the level of mental processes but at the level of applying the processes in specific environmental contexts.

Simulations & Situational Tests as Assessment Tools

Simulation technology has been shown to accurately and reliably diagnose performance strengths and weaknesses, and is used both in staffing assessments and for determining where to focus training. (Weekley & Jones).

Although experts agree that situational tests and simulations are effective predictors of future performance, there is considerable debate as to exactly why they work. Sternberg and colleagues (Sternberg et al., 1995), argue that "street smarts" or tacit knowledge which they describe as domain-specific ability to solve real world problems, is what separates high performers from low performers. Situational tests work because they can form the basis for measuring these street smarts.

The second perspective suggests that situational tests are valid predictors of performance because they involve use of several ability and skill dimensions. Chan and Schmitt (1997) have argued that an "individual judgment problem is nearly always multidimensional in nature in the sense that an adequate solution or handling of the problem involves several ability and skill dimensions." In other words, situational tests work because they test for or at least provide the ability to preview different kinds of skills and competencies working together.

There is a growing interest in the use of situational tests in hiring process, particularly for customer service jobs. In "Further Studies of Situational Tests," Weekley and Jones describe the development of tests for hiring hourly employees in retail and hotel customer service functions.

CASE STUDY: HOSPITALITY & RETAIL HOURLY WORKERS

The Process: Focus groups of both managers and hourly employees were interviewed to gather critical incidents of employees interacting with customers, peers, and supervisors. From these incidents, a total of 40 situational questions were written, each with five possible response options. Here are two sample questions:

A customer asks for a specific brand of merchandise the store doesn't carry. How would you respond to the customer?

1. Tell the customer which stores carry that brand, but point out that your brand is similar.
2. Ask the customer more questions so you can suggest something else.
3. Tell the customer that the store carries the highest quality merchandise available.
4. Ask another associate to help.
5. Tell the customer which stores carry that brand.
 - a. Which of the options above do you believe is the *best* under the circumstances?
 - b. Which of the options above do you believe is the *worst* under the circumstances?

You are the only bellcap at the front of the hotel because your coworker just left for a short break. A guest asks you to get him some fresh towels. What would you do?

1. Ask the guest to inform someone inside of the hotel of the request.
2. Leave your door to get the towels for the guest.
3. Wait until your coworker returns and then take care of the request.
4. Explain to the guest that you are unable to leave your post.
5. Get someone else to help the guest and follow-up.
 - a. Which of the options above do you believe is the *best* under the circumstances?
 - b. Which of the options above do you believe is the *worst* under the circumstances?

These and similar studies consistently show that situational tests and simulations of real world situations are effective tools for previewing how a person is likely to act in a given situation and therefore are effective for assessing and selecting customer service personnel.

These studies also show that more experienced employees are better able to solve the problems presented in a typical simulations (Smith & McDaniel, 1998; Sternberg et al., 1995; Weekley & Jones, 1997). However, this relationship may not be a simple as it would first appear.

The experience that counts when exercising judgment on the situations presented here is apparently more than simply "time in grade" with an employer. Instead, it seems that a broad base of experience, including exposure to multiple employers and a stable history of work, is more relevant. These results support Quinones et al.'s (1995) contention that experience is a multifaceted construct and one worthy of further exploration.

It's not just experience that matters.....

Practical intelligence as embodied in tacit knowledge increases with experience, but it is profiting from experience, rather than experience per se, that results in increases in scores.

-- *Sternberg*

Studies also show that women and minorities tend to score better on situational tests than tests based solely on cognitive skills (which suggests that situational tests may be able to level the playing field).

Criteria for Technology-Based Learning-By-Doing Programs

Technology-Enabled Experiential Learning programs should:

1. Be able to dynamically adjust and modify instruction based on what the learner already knows. At the same time, build on existing knowledge and skills.
2. Solicit feedback from the learners through a live, interactive method and then dynamically adjust content and instruction in an ongoing manner based on feedback.
3. Support multiple learning methodologies and be able to switch methods based on content, the learner and the specified instructional activity.

4. Contain a separate repository of information that goes beyond what is contained in the lesson being presented to the student. This information should be built into the curriculum as more in-depth knowledge that can be accessed by the insightful learner. This additional information may be contained in a separate repository of information that can be accessed by the learner in much the same way that classroom learners use an encyclopedia or reference manual for more information.
5. Have direct links to an array of resources contained within an organization, as well as ease of connectivity to these resources on demand, for use when the learner has the need and interest.
6. Start each learning session with a clear goal or instructional outcome. Subsequent learning activities should be designed to build knowledge and skills toward the attainment of that goal. Instructional Systems Design (ISD) methodologies ensure that the curriculum developed is explicitly derived from and build back to the desired learning outcome.

Chapter 4: Learning Styles

Learning styles research looks at the psychological, social, and physiological dimensions of the learning process. With learning styles, we look for clusters of people who use similar patterns for perceiving and interpreting situations. We can then use this information to adjust our learning programs and environments so that they better suit the needs of the learner.

People learn best when they can take in knowledge in ways that are natural to them. If their orientation to the world draws theory from concrete experience, then they will learn best through doing rather than reflecting. If their personal style is oriented around abstraction, then their best learning will be abstract. Auditory learners will learn well in lecture settings; private learners will gain knowledge from quiet reading. (O'Conner).

Information Processing Models

Information Processing models help us understand the processes by which information is obtained, sorted, stored, and utilized. The most recognized idea about information processing is the right brain/left brain concept. A more complex approach is Kolb's experiential learning model. Kolb maps out four quadrants and shows how they can serve as stages of learning. The Gregorc model is a similar information processing model. Howard Gardner's Theory of Multiple Intelligences is another popular model.

Personality Models

Personality models describe the deepest most personal traits that shape our orientations of the world. The popular Myers Briggs Type Indicators categorizes people as extroverts/introverts, sensing/intuition, thinking/feeling, and judging/perceiving. How individuals rate along these scales indicates tendencies in their attitudes toward engaging the world, their values, instincts and behaviors.

Kolb's 4 Learners

Theoretical learner: learns by reading, researching, listening to lectures. Needs a quiet library and space for learning to take place.

Reflective Learner: has a matrix brain and needs to take all available information and quietly and slowly sift through it before making conclusions. Usually conclusions are right on the money, and this person can see “down the road” problems with a course of action.

Process Learner: things become real to this person with talking. Talking is the learning process. This person is good at brainstorming, is good in small groups, but lecture is deadly.

Do it Learner: Things become real to this person when he/she does the process. They want an immediate response, are hands on, get-the-job-done types.

Important to note that most of us are combinations of each of these styles. Some combinations are shown below along with the Kolb Learning style.

Reflective/Theoretical = *Assimilator* This person takes abstract concepts and can turn them into practical use. In a musical context, this person would study theories and the abstract ideas of style and could then turn them into music from different time periods. They would likely feel more comfortable with lots of lessons.

Processor/Reflector = *Diverger* This person is strong on imagination and can view a concrete situation from a variety of perspectives. They still need the brainstorming and verbalizing, but also will read and do research. This person would do well in a music group who was working on their own style from the perspective of many different backgrounds. They would do well in an energetic, talk it through, work it out type instruction.

Processor/Does = *Accommodater*. This person talks and works to make things real. They can make any situation concrete. Good adaptor, can survive any situation. The example given was “drop this person in a jungle and watch them survive.” (Again in terms of music—workshops rather than private lessons. Would do best in a processor workshop where talking was not discouraged. Very likely to go the no-lesson route and do well that way.

Doer/Theoretical = *Converger*. This person can take ideas and turn them into concrete situations. Practical application of ideas is a great strength. (So here we have the harp builder who can study the pictures of the ancient harps and read some descriptions and make the harp)

Gregorc

Anthony Gregorc, professor of curriculum and instruction at the University of Connecticut, notes four types of learning styles:

1. **Concrete Sequential** Thinkers tend to be based in reality. They process information in an ordered, sequential, linear way.
2. **Concrete Random** Thinkers are experimenters.
3. **Abstract Random** Thinkers organize information through reflection, and thrive in unstructured, people-oriented environments.
4. **Abstract Sequential** Thinkers love the world of theory and abstract thought.

Solomon's Inventory of Learning Styles

Barbara Solomon's Inventory of Learning Styles has four dimensions: Processing, Perception, Input and Understanding. The following table describes the learning styles within each of those dimensions. It also shows techniques and strategies for implementing learning programs that meet the needs of the particular learning styles.

PROCESSING		
Learning Style	ACTIVE	REFLECTIVE
Characteristics	Active learners understand and retain information best by doing something with it – discussing or applying it or explaining it to others. They prefer working in groups. Their motto is: "Let's try it and see how it works."	Reflective learners need time to go away and think about it first. They prefer working alone. Their motto is: "Let's think it through first."
Techniques & Strategies	Use of study groups, web-based discussion groups, hands-on classes where you work through projects in teams.	Build in time and support for reflection. Stop periodically to review what's been done, think of possible questions, applications or different ways you might go about a task.

	Test learning by explaining or showing someone else how to do it.	
PERCEPTION		
Learning Style	SENSING	INTUITIVE
Characteristics	<p>Sensing learners like learning facts. They are practical and careful and believe in doing things right (They believe there is a single "right way.")</p> <p>Sensors follow the rules, respect authority and expect things to operate as stated.</p> <p>Sensors like solving problems by well established methods and dislike complications and surprises.</p> <p>Sensors tend to be patient with details, good at memorizing facts and doing hands-on work.</p> <p>Sensors remember and understand information best if they can see how it connects to the real world.</p>	<p>Intuitive learners like discovering possibilities and relationships.</p> <p>They work fast, take risks and are often innovative (but sometimes overlook details or make careless mistakes).</p> <p>Intuitors like variety and innovation. They hate repetition.</p> <p>Intuitors are good at grasping new concepts and are comfortable with abstractions and ambiguity.</p>
Techniques & Strategies	<p>Give them classroom settings that are friendly, foster cooperation, consistency and hard work.</p> <p>Sensors do well talking to other people who have used the knowledge to get an understanding of how it is applied.</p> <p>Sensors do well when expectations and instructions are clearly stated. Proactively seek out this information.</p>	<p>Give them logical and well-researched lectures followed by opportunities for long term independent projects which offer opportunities for experimentation, invention, complex problem solving and discovery and intellectual exploration.</p> <p>To appeal to Intuitives, look for ways to make the information novel.</p> <p>Provide opportunities to expand the information, contextualize it. Look for different interpretations and perspectives.</p>

INPUT		
Learning Style	VERBAL	VISUAL
Characteristics	Verbal learners get more out of words – written and spoken explanations of things.	Visual learners learn best when they can see pictures, diagrams, flow charts, time lines, videos, etc.
Techniques & Strategies	<p>Auditory learners do well in traditional lecture settings in classrooms and seminar.</p> <p>Verbal learners can add to learning by further discussion with other people about the topic.</p> <p>Consider use of web-based audio interviews, discussion groups, books on tape.</p>	Provide diagrams, sketches, schematics, photographs, flow charts or any other visual representations to help learners understand the information.
UNDERSTANDING		
Learning Style	SEQUENTIAL	GLOBAL
Characteristics	<p>Sequential learners tend to gain understanding in linear steps, where each step follows logically from the previous one.</p> <p>Sequential learners tend to follow logical step by step paths in finding solutions. Don't regularly go "outside the box."</p>	<p>Global learners learn in large jumps, absorbing material almost randomly without seeing connections then suddenly "getting it."</p> <p>Global learners are good at solving complex problems quickly or putting things together in novel ways once they have grasped the big picture, but they may have difficulty explaining how they did it.</p>
Techniques & Strategies	<p>Outline what the learner is going to learn in a logical step-by-step manner.</p> <p>Utilize spreadsheets, flow charts and outlines to help organize information.</p>	<p>Enable view of the big picture before getting into details.</p> <p>Use summaries and overviews.</p>

Source: Felder and Soloman – NC State

Using Technology to Accommodate Solomon's Learning Styles

Clearly multimedia software favors visual learners. Images, graphs, animations, movies, schematics and other visual objects greatly enhance the presentation of material. In developing multimedia software, one must be particularly aware of the opportunities to improve the presentation through the use of visual clues.

Visual students find movies much more useful than do verbal learners. They also appreciate a visual navigation scheme, with menu buttons always present on the screen.

Global learners learn best when the technical material is placed in a larger context. The use of multimedia allows us to present this context easily.

Discovery is a very important part of the educational process and is easily achievable through the proper implementation of multimedia. The use of multimedia engages students actively in their learning, and exposes them to the subject matter in exciting ways that traditional learning methods cannot. Using simulations allows students to take an active role in the educational process, in that it frees them from being passive recipients of information.

Sensors prefer to deal with actual data and facts. The best activity for sensors is an actual experience, such as a laboratory, in which they could actually obtain and analyze experimental data, but often it's not possible to provide this experience. Interactive software that includes a simulation of a real system can play an important role in meeting the needs of sensing learners.

Chapter 5: The Promise of Technology

A Glimpse Into the Future

Futurist and author Richard Worzel paints a vivid picture of how technology will enable learning and dramatically change the way we work.

Technology will continue to get cheaper and more powerful. As a result, computers will become our constant companions. While a student is studying, her computer will observe her eye movements, small minutiae about her body language, her galvanic skin response, body temperature, and other clues as to her state of mind. Her computer will read her brain waves directly, and impute from them whether she's understanding what's being presented or not. Moreover, she will learn what she needs, when she needs it in a form of "just in time" learning that we can now only fantasize about, and which the corporate world is now experimenting with.

Possessing so much information about the student, each student's computer will be able to guide her, find those things that interest her most, and find the best ways of presenting them to her. From this experience, her computer tutor will gradually discern those subjects that are of greatest interest to her, and begin to guide her towards her best career by integrating her interests with what the marketplace needs.

Next, distance education will become so obvious an extension of education, so easily fulfilled that it will be foolish not to use it. We grew up in a world where communications was expensive ("Get in here quick! Gramma's on long-distance!"), but we will live in a world where it will be incredibly cheap. We will have virtual meeting places, where people project images that allow them to gather in cyberspace, with much of the effect of meeting in person. Moreover, everyone's talents and abilities will be known, so it will be a simple task for a child's computer to link her with just the right teacher or tutor for anything she wishes to study.

The educational gap between have and have-not, which will widen during the early years of the 21st Century, will eventually vanish as the technological resources crucial to education become so cheap that everyone will have access to them. Getting there will be a major problem, though, as we are entering an era of rapidly widening inequities.

Careers and the workplace will be dramatically different from today. There will be no grunt work, no menial labour. There will be routine work, but only because that is what the individual wants, and because it will be what makes that individual happiest. The concept of work will become defined as "that activity that makes the individual most fulfilled." Our computer servants will do all the truly necessary work that humans don't want to do. We will finally reach a stage of thought, creativity, and work for pleasure of work that Socrates could only have dreamed of.

--Richard Worzel (1999)

Tomorrow, access will be through a corporate-sponsored community completely tailored to the individual's needs, with content delivered on demand and technology that will continually monitor the learner's abilities as the learning takes place, adjusting content and pace seamlessly.

-- *Wade Baker, CEO, Payback Training Systems*

Interactive software is a branch of movie making. Movies are events on a screen that affect the heart and mind of the viewer. To which software adds *interaction*. The events of a movie, and what they do to the viewer, must be fine-tuned. This is the work of the movie director - specifying, reworking and melding effects to get the right feel, the right atmosphere. In software, a similar fine-tuning of the events and interaction must become the work of the *software* director, whose presence has not yet been missed, but who is needed now more than ever."

Ted Nelson, of Hypertext and Xanadu fame

What's Driving e-Learning?

Business Drivers

A number of factors are converging to make technology-based training a key enabler of business growth, perhaps even the key to business survival. Companies need their workers to learn new skills and learn them fast. Traditional approaches are cost-prohibitive and ineffective. Technology offers the opportunity to both reduce the costs of training and improve the quality.

The chart below provides a snapshot of change drivers and technology advances.

What's Driving the Change? (Demand)	Technology (Supply)
<ul style="list-style-type: none"> • Rapid obsolescence of knowledge and training • Focus on life-long learning • Need for just-in-time training delivery • Search for cost-effective ways to meet learning needs of globally distributed workforce • Skills gap and demographic changes drive need for new learning models • Demand for flexible access 	<ul style="list-style-type: none"> • Internet access is standard for large percentage of the population. • Advances in digital technologies enable creation of interactive, media-rich content. • Increasing bandwidth and better delivery platforms make e-learning more attractive. • Growing selection of high-quality e-learning products and services. • Emerging technology standards facilitating compatibility and usability of e-learning products.
<p><i>Source: SRI Consulting and WR Hambrecht</i></p>	

The Advantages of Technology-Based Learning

The reality is we simply can't accomplish what we have before us without technology. There aren't enough people even if we wanted to deliver training in traditional classroom arrangements. Plus, the costs are prohibitive and the results, less than stellar. As *Learning Enterprise* Editor Manasco says "It's just not feasible to put employees in classrooms. Classroom training is enormously expensive and notoriously inefficient in terms of retention and recall."

Technology-enabled learning is not a difficult sell, primarily because many of the benefits are tangible and fairly immediate. Technology-enabled learning saves money (50-70% cheaper than classroom programs), it minimizes time away from work (avoids opportunity costs), and it makes for happier and more productive employees (provides freedom to learn when and where the learner chooses).

With traditional training methods, companies spend more money on transporting and housing trainees than on actual training programs. Approximately two-thirds of training costs are allotted to travel expenses. Add on opportunity costs resulting from time away from work, and the actual costs go even higher.

Time spent away from the job traveling or sitting in a classroom reduces per-employee productivity and revenue tremendously.

-- *WR Hambrecht Study, March 2000*

According to a report by Thomas Weisel Partners, Dow Chemical estimates dramatic savings from an initial training investment of \$1.6 million. They expect to save \$4 to \$5 million during the first year, \$8 to \$10 million in year two and \$17 to \$20 million in the third year of its e-learning investment.

Technology-enabled learning also results in long-term gains. It supports the changing learning paradigm by putting the learner in control, by providing safe practice areas where trial and error is encouraged and feedback given, where learners articulate and share learnings, teach others, and learn collaboratively. The following table summarizes some of the key benefits of technology-enabled learning.

Key Benefits of Technology-Based Learning	
Benefit	Description
Cost Effectiveness	<p>Technology-enabled training costs less than traditional instructor-led training. There are no travel costs associated with sending people to training classes. No classrooms to set up, no trainers to hire and train. According to the report "Return on Investment and Multimedia Training" the actual time required for training by computer averages about 50% that of instructor-led training, lowering costs even further.</p> <p>A 1977 Study by the Sprint Corporation found that students learned slightly more with computer-based training than they did in the classroom, and gained the knowledge in "just more than half the time, thereby reducing their time away from work."</p> <p>Technology-enabled training enables companies to train large amounts of employees at no extra cost.</p>

Key Benefits of Technology-Based Learning	
Benefit	Description
Just-in-Time	Technology-enabled learning allows individuals to learn on an as-needed basis. Employees or students can access information closer to the time the knowledge is needed rather than obtaining information that may never be used or may be used in the longer term.
More Training in Less Time	Companies are able to deliver training on a more timely basis. And they are able to deliver greater amounts of training in a shorter period of time.
Flexibility	Technology-based training provides flexibility, accessibility, and convenience. It enables learners to learn when and where they want to learn.
Learner Controlled	Technology gives the individual greater authority over the learning environment.
Self-Paced	Learners can proceed through a course or program as the information is fully comprehended. Students can convert information to knowledge on their own timetable.
Engaging	The use of multimedia engages students actively in their learning, and exposes students to the subject matter in exciting ways that traditional learning methods cannot. People remember best what they feel the most. Multimedia technology helps impart emotional intensity and make it personal (stimulating feelings).
Interactivity	Technology enables interactive learning environments where learners can play an active role in their learning process.
Safe Learning Environment	When people are learning in a large group, they're sometimes afraid to speak out because they are afraid of making a mistake and don't want to look foolish. Says Roger Schank, director of Northwestern University's Institute for the Learning Sciences, "The greatest value of computers is that they will watch out for you and let you do stuff without fear of embarrassment."
Accessibility	Learning can be accessed from various places and learners can communicate with instructors and other learners without having to be in the same room.
Uniformity of Content	Information delivered can be consistent to all users, therefore reducing the possibility for misinterpretations.
Customizable Content	Information can be developed with individual users in mind. Courses and programs can be created to deal with each individual's strengths and weaknesses and learning styles.
Content Updated	Product and procedural changes can be updated and delivered in real time. This increases the rate at which knowledge is acquired.

Key Benefits of Technology-Based Learning	
Benefit	Description
Rapidly	
Enables Apprenticeship	“Apprenticeship has always been the best learning model, whether from other people or simulations. Computers allow apprenticeship in fields where it’s hard or impossible to do it in real life, like surgery or learning to fly an airplane.” (Roger Schank)

“The best interactive media programs can accomplish much of what a great teacher can do. They can excite interest; explain clearly with great, even stunning examples; allow learners to manipulate, play with, and develop ownership of concepts; provoke reflective consideration of them; and they can -
- yes -- empower and set free.
-- *Wills 1994*

How Companies are Using Technology-Based Training

Buckman Laboratories of Memphis, Tennessee sells specialty chemicals in more than 100 countries. Attending traditional classes is out of the question for many employees who spend 80 percent of their time out the office visiting customers. So in 1997, Buckman launched their Bulab learning center, where all employees can take courses over the Web at their convenience. Buckman uses a variety of approaches including simulations and live learning via the Internet. Through arrangements with accredited universities, employees can even earn advanced degrees through the program.

JCPenney uses its FirstClass system to provide managers and supervisors with reference materials, peer-group interactions and training materials for their job functions. When a user logs in, the system opens a desktop that is unique to their position. A store manager, for instance, would see icons for personnel, operations and merchandising systems. Each category has nested folders for various duties, with daily, weekly, monthly and annual checklists. Under Operations, the store manager would have folders for topics such as loss prevention and maintenance. JCPenney also conducts live courses via satellite-equipped classroom and over the internet. The result is that company training has been able to accommodate 100 percent of its managers annually while saving more than a million dollars over the past three years. (*Knowledge Management Magazine*, August 2000).

General Motors implemented an application that enables mechanics to learn while they work. Technicians wear a small PC on their belts and control the voice-driven

system by speaking into microphones. They view a graphical interface on a flat-panel display mounted nearby. The system presents the appropriate materials to the user based on his or her expertise and difficulty of the problem. Expert users get fast access to technical details, while novices get on-demand training for specific tasks. When technicians finish a repair, they describe the procedure aloud, noting any undocumented problems or solutions they discovered. GM plans to use its dealer intranet to send technicians comments back to GM headquarters. Technicians at GM will review the reports and decide whether to alter a service procedure or add a mechanic's discovery to the training materials. (*Info Week*, March 1998)

Hewlett –Packard cut some of its sales-training costs from \$2 million to \$200,000 per year. Previously the company took their conventional dog-and-pony show to 12 different cities, which took four to five weeks per quarter. Now through an interactive satellite network, training sessions require just two days, and nobody has to travel. Additionally, the message and delivery are more consistent, and there's a much shorter lag time between distribution and utilization of information. (*Byte*, March 1995)

Sun Microsystems' Sun University has an Education and Development portal which is broken into three distinct areas – *My Library* links learners to news articles, research databases, market research, technical and engineering information and product information, as well as real time news alerts and access to purchasing books and other learning materials through outside vendors. *My Training* links to explicit learning opportunities and continuous professional development. Learners can access a broad array of Internet-based courses; review a complete catalog of classroom-based course, competency roadmaps, development plans, learning paths, schedules, and interactive learning communities. *My Job* provides learners with tactical, performance supporting job aids. (Weisel, 2000)

Costs of Technology-Based Training

A 1994 study of computer-based training found that the mean number of hours required to create a single hour of courseware was 228 (Referenced by Asymetrix – Linsk). At a conservative rate of \$100 per hour, that works out to more than \$20,000 per hour of courseware.

More recent estimates reflect improvements in technology and application development methods. According to Tom Sanco of Westwillow Multimedia, a knowledge management and learning solutions provider, the days of six-month

development cycles are long gone. “Companies typically have short windows in which to operate. You’ve got to be able to produce a quality product in three to six weeks.”

Even using the 1994 metrics, the costs of computer-based training are significantly less expensive than transporting employees to a central location, putting them up in hotels, and forfeiting their lost productivity.

CASE STUDY: THE ROUSE COMPANY

The Rouse Company in Columbia Md is a property management and development company that operates more than 200 retail centers, office complexes and industrial sites. The company needed to train almost 700 employees in 70 locations across the US to use a new financial software application. According to Joel A. Manfredi, VP of Information Strategies, Rouse originally anticipated that he would have to put 12 trainers on the road continuously for five weeks, resulting in travel expenses of roughly 82,000 and \$130,000 worth of lost productivity (just for the trainers). When trainees are traveling and away from their jobs, the costs increase dramatically. “Even in the most conservative view, 700 people saving a week of time is worth \$1076,600. This was a big deal,” Rouse adds. (Knowledge Management Magazine, August 2000).

What Types of Content are Not Suited for Technology-Based Delivery?

Because of its nature, relative value, or importance, certain types of content are not well-suited for technology-based delivery. Strategy training, for example, still needs to be done face-to-face in most cases, since this area involves continuous give and take. Other educational content that does not translate well into a virtual environment is material requiring significant hands-on application, with a strong emphasis on peer review and collaboration. Examples include classes taken to improve writing, communication, or presentation skills where the perception of eye contact, body language, facial expressions, as well as direct dialogs and sharing of experiences are necessary for the comprehension of the subject matter and the success of the course.

Any process involving motion or hand-eye coordination – welding, for instance – is best left to in person training, says Elliott Masie of the Masie Center. Emotional

subjects should also be taught face to face, Masie says. For instance, he says. "I wouldn't teach how to fire someone online." He also advises against web-based teaching of things that are deeply conceptual in nature, recommending instead that training focus on procedural topics. Thus, organizations should avoid using the Web for instruction on the fundamentals of programming but consider it for teaching how to query a database, create a cell in a spreadsheet or process and expense form. (*CIO Magazine*, October 1997).

Buckman Labs uses technology-based training in many different areas but still sends employees to labs to see and smell its chemical products. VP of HR Mark Koskiniemi points out that there is no substitute for the real thing when teaching field sales reps about the chemical reactions of solvents.

Getting Employees to Embrace Technology-Based Learning

The ASTD notes the following recommendations for ensuring acceptance of technology-based learning in your organization.

Attracting & Retaining Learners in Technology-Based Learning

- Use the technology to enhance learning in new and unique ways.
- Maintain high standards of instructional design.
- Provide learners with opportunities to acquaint themselves with the technology prior to the program.
- Thoroughly test the reliability and dependability of the technology prior to full deployment.
- Enhance managers' awareness and appreciation of the benefits and advantages of technology-based learning.
- Develop individualized learning contracts and objectives for learners to guide and direct them through the full program.
- Incorporate frequent opportunities for feedback through email to enhance learners' sense of belonging to the program.
- Follow-up with program dropouts to enhance future technology-based learning programs.
- Break the material into small chunks of 8-15 minutes to accommodate learner's busy work schedules.
- Let learners bookmark their progress and resume at a later time.

Source: Mark Van Buren – ASTD Trends Watch 1999

Evaluating Technology-Based Training

The key question in evaluating technology-based training, or any learning for that matter, is whether or not people actually learn actionable skills.

Merely having multimedia objects does not make for instructional effectiveness. Are the media objects relevant to the instruction? Do they facilitate the learner in achieving their learning objectives? Are they efficient? Appealing? If media objects are merely decorative and serve no specific instructional purpose, they may in fact interfere with, rather than facilitate training. (Merrill, 1997).

Shown below is a list of dimensions that should be examined in evaluating technology-based training.

1. Content

1. Does the content meet your specific needs?
2. Is everything the learner needs included?
3. Does the program include the right amount and quality of information?

2. Instructional Design

1. Is the course based on sound instructional design methods?
2. Is the course designed in such a way that users will actually learn?
3. How is effectiveness determined?

3. Engagement/Interactivity

1. Does the program engage the learner?
2. Does it hold their attention?
3. Is there interactivity?
4. Is it the right amount of interactivity?
5. Is the user engaged through the opportunity for input?

4. Navigation

1. Is there an overall course map?
2. Can users easily find their own way through the program?
3. Are there exit options available in key places?
4. Can users save their work and return to it where they left off?
5. Is there an appropriate use of icons and/or clear labels so that users can easily determine where to go or what to do?
6. Are learners able to get a feel for the domain before attending to details?

5. Motivational Components

1. Does the program motivate the learner to continue moving forward?
2. Does the program take into consideration and accommodate different motivators?

6. Use of Media

1. Does the program appropriately and effectively employ graphics, animation, music, sound, video, etc.?
2. Is the gratuitous use of these media avoided?
3. Is the soundtrack annoying or distracting?

7. Sequencing

1. Is the program structured to enable learners to build on existing knowledge?
2. Are tasks organized from simple to more and more complex?
3. Are there increasingly diverse problem solving situations?
4. Are learners able to get a feel for the domain before attending to details?

8. Feedback and Evaluation

1. Is feedback provided to learners?
2. Is there some type of evaluation, such as:
 - a. completion of a simulation?
 - b. mastery of each section's content before proceeding to later sections?
 - c. section quizzes?
 - d. final exam?

9. Aesthetics

1. Is the program attractive and appealing to the eye and ear?
2. Does the structure of the screen add to the program?

10. Record Keeping

1. Are student performance data recorded?
2. Is the data available to the learner? Course managers?
3. Is performance information available in aggregate form?

11. Language & Tone

1. Is the language understandable by the audience?
2. Are acronyms, technical terms and such explained?
3. Is the program's tone suitable for the audience? Does it avoid being condescending, trite, pedantic, etc.?

12. Personalization

1. Does the program support different learning styles?
2. Does the program capture what the learner knows going into the training and customize the presentation accordingly?

13. Scalability

1. Is the content scalable in terms of development, delivery technology, and/or distribution.
2. Is it template based? Does it use reusable learning objects (which can speed up R&D and enable mixing and matching of components)

Additional Criteria

Nancy Lewis and Peter Orton from IBM suggest that in order for an innovation to be accepted and effected, it must have the attributes shown below. These criteria are also useful for evaluating technology-based learning products.

1. Relative Advantage: degree to which the proposed innovation is perceived as better than existing alternatives. The advantage may be in terms of profitability, speed, prestige, etc. In the case of online learning it may be just-in-time access and the advantage of being

able to focus on precise skills development for specific needs, as opposed to having to sit through an entire class covering a broader set of skills.

2. Compatibility: degree to which the innovation is consistent with existing values, past experiences, or needs of potential adopters. A compatible idea or process will fit more closely with a learner's life situation, requiring less adjustment.

3. Simplicity: degree to which the innovation is perceived as being easy to understand and use.

4. Trialability: the degree to which an innovation may be experimented with. Does it offer the opportunity to try it out?

5. Observability: the degree to which the results of an innovation are visible to others.

Glossary

application Service Provider (ASP):

specialized form of an Internet Service Provider (ISP) that allows a company to have a software application hosted via a rental fee.

asynchronous course delivery:

asynchronous learning describes a learning event in which people cannot communicate in real time. Examples are self-paced courses taken via Internet and CD-ROM, videotaped classes, streamed audio/video Web presentations, Q&A mentoring, online chats and discussion groups and email.

computer-based training (CBT): course of educational material presented on a computer, primarily via CD-ROM or floppy disk. Unlike Web-based training, computer-based training does not require a computer connected to a network and does typically not provide links to learning resources outside of the course.

content: the intellectual property and knowledge included in the training. It consists of the course outline, text-based knowledge modules and multimedia. Different types of e-learning content include text, audio, video, animation and simulation content.

distance learning: educational situation is which the instructor and students are separated by time, location, or both. Education or training courses are delivered

to remote locations via synchronous or asynchronous means.

e-learning: the delivery of content via all electronic media, including the Internet, intranets, satellite broadcast, audio/video tape, interactive TV and CD-ROM. Used synonymously with technology-based learning. Examples include virtual classrooms, audio/video conferencing, Internet telephony, and two-way live satellite broadcasts of lectures to students in a classroom.

knowledge management: capturing, organizing and storing knowledge and experiences of individual workers and groups in order to make it available to others. This includes formal corporate information (policies, procedures and product information), informal information (documentation, reports, and presentations), and expertise (lessons learned, stories and case histories).

learning portal: Any web site that offers learners or organizations consolidated access to learning and training resources from multiple sources. Operators of learning portals are also called content aggregators, distributors or hosts.

multimedia training: computer-based training that uses two or more media such as text, graphics, animation, audio, and video. Multimedia training can be delivered on CD-ROM or through the World Wide Web.

simulations: highly interactive applications that allow the learner to model or role play in an actual scenario or business situation. Simulations enable the learner to practice skills or behaviors in a risk-free, simulated environment.

synchronous course delivery: synchronous learning stands for a real-time, instructor-led online learning event, in which all participants are logged on at the same time and communicated directly with each other.

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