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THIS WEEK — DESIGN STRATEGIES

The Power of Simulation-based e-Learning (SIMBEL)

BY RANDALL KINDLEY, PH.D.

You are sitting at your desk at Amalgamated Enterprises, starting your normal workday. You answer email, and then move on to customer inquiries stored on your voicemail. After that you have to set up a supervisor's meeting and create the agenda. While you are working on this, a customer enters your office with a pained expression on her face. After clarifying the nature of her problem, you direct her to an appropriate piece of company literature. Later, she returns to your desk irate. The literature was not

on the rack! She leaves in a huff and you feel devastated. She was — that is **was** — one of your company's best customers. Where was your mentor when you needed him?

"It's going to be a tough morning!" you say to yourself as you lay back, wiggle your toes in the warm beach sand and drink in the fragrant tropical air. What?! You are not at the office at all! In fact, you have never worked at Amalgamated. But you soon will. You were recruited as an administrative assistant and signed your contract last week. They want you to start at the beginning of next quarter. To make sure you are off to a running start they asked you to complete their office procedures training. It's available online or on CD, so you had them mail the CD to you in care of the Post Office in Key West.

E-Learning can be this way, creating a dual reality in which you immerse yourself in a real work situation. Simulation brings key experiential learning moments to you, usually by allowing you to fail fast, fail often, but fail safely. The result is that simulation can help you *internalize* valuable knowledge and work skills almost without realizing that you are "going through training". If you are a Training Director or Training Services Coordinator, chances are you have complained about "Teflon™ training", the kind of training that does not

Continued on next page

Creators and managers of e-Learning are under pressure to obtain the highest leverage possible in every learning experience. Simulationbased e-Learning (SIM-**BEL)** offers the optimum experience in many cases, especially when blended with instructorled activity. Simulation makes it possible to maintain learner enthusiasm and support real performance change. This article presents a delivery method that can surprise and delight learners and managers alike.

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TABLE 1: How simulation-based e-Learning differs from other delivery vehicles					
	Asynchronous e-Learning	Scenario	Simulation	Game-based	
What	Information	Behavior	Performance	Abstract and Intuitive Skills	
How	Information display and retention assessment	Situation response	Near or pseudo reality	Artificial or heuristic reality	
Learning Domain	Recall	Reasoning	Intuitive/ Emotional	Emotional/ Physical	
Time Constraints	Less			More	
Product Complexity	Lower			Higher	

stick and is seldom transferred from the e-Learning program to changes in behavior and performance. And on top of that, you are seeing plummeting completion rates for the expensive e-Learning you have already purchased. As professionals in the training industry, our job is to find a way to leverage the great technologies we have in a way that keeps enthusiasm and applicability high, that competes effectively for the mind-share of a new generation, and that continues to boost return on investment. Simulation-based e-Learning (SIMBEL) promises to tear off the Teflon, generate enthusiasm and create real performance change.

Often, those considering an e-Learning solution ask me very basic questions such as, "How is simulation-based e-Learning different, what makes a good simulation, and where should I apply simulations?" The purpose of this article is to provide some answers from my own observations and those of producers of simulation-based e-Learning products. This may serve as a starting place for these training managers or service coordinators rethinking their learning strategy.

Finally, this article is a companion to "Scenario-based e-Learning: A Step Beyond Traditional e-Learning", published online in ASTD Learning Circuits. (http://www.learningcircuits.com/2002/may2002/kindley.ht ml) Much of the information in that article will be relevant to simulation-based e-Learning.

What is simulation-based e-Learning?

When I interviewed Daniel Hamburger of Indeliq for this article, he offered a simple definition of simulation-based e-Learning. Hamburger says it is "learning by doing". In traditional asynchronous e-Learning, students tend to be restricted to a predetermined learning path through reading and observation. In simulations, learners select and pursue experiences assembled as they respond to questions and other stimuli.

This is the essence of simulation and how it differs from traditional instructor-led learning, from scenario-based learning, from game-based learning, and from other asynchronous e-Learning. In contrast to these other learning delivery methods, simulations are dynamic, moving learning events in which you actually perform a job and experience the results just as if you were really there. There is a qualitative leap that changes the way we react and learn and that stimulates a wide range of both physiological and psychological learning accelerators that are hard-wired within us. These differences are categorized in Table 1.

We are all most familiar with traditional asynchronous e-Learning courses, which transfer basic information to achieve explicit and limited learning objectives. Information is displayed and we are asked to recall that information in a test or assessment. This kind of e-Learning has acquired the moniker "page-turner" because of this cut-and-dried approach.

More interactive approaches, like scenario-, simulation-, and game-based e-Learning change the e-Learning experience in several ways.

What: By way of comparison, scenariobased learning is more about particular discrete behaviors. In these the learner is presented with a specifically defined situation. For example, "You are a sales associate in an electronics store and you see a customer browsing the audio equipment. What do you do?" Only a few specific options are available to the learner. The options all involve a prescribed reactive behavior (e.g., introduce yourself, walk away, etc.).

Although game-based learning may appear similar to simulations, games actually return to particular skills abstracted from reality. As a result, games deliver abstract or intuitive skills and tend to be more limited in the scope of the "action". The environment is reduced to a set of rules that constrain the learner(s) and the characters in the game.

Simulations are qualitatively different from games and scenarios. There are usually many different behavioral paths that can be successful. More importantly, simulations re-orient us to performance, or *preferred outcomes* that may or may not require these rigid sequences of behaviors (though there clearly are preferred behaviors and sequences to successfully complete some simulations). As a general rule in simulations you can be successful by combining different actions in varying sequences as long as the *outcome* (not necessarily the discrete behavior) is acceptable.

How: Scenarios pose situations and request a particular response. In contrast, both simulations and game-based e-Learning seek to create a whole reality in which the participant is immersed. For simulations, the reality is meant to mirror the real work environment. For games, the reality is artificial and not meant to be a representation of what you can see out your office door.

Learning Domain: As Bill Wiltschko of eDrama puts it, "The former (scenariobased learning implementations) still suffers from limited student choice and forcing students to over-cogitate about what are essentially emotional tasks." Simulations push the student to (eventually) react in a learned but intuitive way to stimuli just as in the real work-world. And this makes good sense. Think of space shuttle pilots who may have only seconds to make critical decisions that require significant engineering knowledge and information. Their ability to integrate data and make a quick decision must be so well honed as to be "intuitive."

When: This kind of reaction level raises another interesting distinction across types, namely the time factor. In traditional asynchronous and scenario-based e-Learning, time on the learning task can be segmented. Good e-Learning programs of these two types usually do not require the learner to complete a module within a certain time (though some do). In fact

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most asynchronous and scenario-based programs have the facility to bookmark. *Simulations and games, on the other hand, use time as one of the variables in the learning experience.* Clearly, if you are waiting on a customer, you wouldn't be able to say, "Well, excuse me, it's my lunch break. Just freeze right there and I'll be back in half an hour." In the latter e-Learning environments time is constrained. In one program I reviewed, by eDrama, if the learner is slow to respond, the customer character in the simulation stares quizzically and asks if there's anything wrong!

Complexity: Complexity clearly increases across the spectrum of types from traditional asynchronous e-Learning to gamebased e-Learning. Traditional asynchronous e-Learning is rather linear (e.g., Chapter One, Chapter Two). Simulations, on the other hand, are relational. That is, you encounter a particular learning event or learning object because of what you did in dealing with some other learning object. It's like the difference between a list and a matrix. You could have six items on a list (e.g., learning items). But if we think about how these factors impact each other, the number of possible interactions increases substantially, to seven-hundred twenty (the number of possible combinations of six items).

Going back to the office procedures example, let's say there are modules on answering the phone, responding to email, and serving a customer. In a simulation, one has to consider the possibility of situations in which any combination of these happens simultaneously. If we think about our own customer service experiences, this would be far more useful training than the linear. How many times has it been obvious to you that the sales assistant waiting on you clearly knew how to answer the phone properly and how to wait on customers (linear), but had no idea how to balance the two tasks in a way that makes all parties happy (relational)?

To sum it up, simulation makes possible "learning by doing" because it focuses on the learner's performance outcomes in a context that mirrors the real work environment, demands more intuitive responses (judgment), is usually constrained by time, and takes into account the complexity of possible interactions across key variables.

What makes for a good simulation? Is it just like reality?

Back in the nineteen-fifties a World War II code breaker turned computer scientist,

TABLE 2: Simulation structural components					
	Model	Failure Staging	Mentor		
Focus	Process or storyline	Critical process points or dramatic moments	Learner		
Role	Defines the dynamic relationships among key variables (ele- ments, learning objects, etc.).	Stages learning moments by leading participant to points in model or story- line where failure can be experienced.	Monitors the learner, assesses needs, and intervenes when appropri- ate to scaffolding and fading plan.		

Alan Turing, formulated a simple test for artificial intelligence: Suppose you are behind a screen asking questions. Someone on the other side of the screen is responding. If what is on the other side is actually a machine and you cannot distinguish the answers you receive from those that a human being would make, then the machine has "artificial intelligence".

Since simulations are supposed to represent reality, some suggest that they must pass their own Turing Test. If we cannot distinguish the simulation from reality, then the simulation is a good one. Well, not so - the logic does not hold. Good simulations are like reality, but not perfect replications of it. Again, here is another example. There is a Star Trek episode ("Shore Leave", original air date December 29, 1966) in which the crew lands on an earth-like planet. Interesting things start happening. Whatever the crew thinks about becomes reality. At one point Dr. McCoy thinks about a female crewmember as a damsel in distress. Immediately a knight appears and skewers the doctor with a lance. McCoy is killed. Understandably, we do not want simulations guite this real.

Instead, a *good* simulation replicates the job environment in most of its important details — enough to create a situation in which the participant can "live" the situation without undue harm. Ideally, responses become affective or intuitive, but this varies by simulation type, since not all work situations require affective or intuitive responses.

A great simulation possesses three additional structural components (See Table 2):

1. A well-developed working *model or storyline* of the environment, so that the simulation *can* lead to successful outcomes,

2. Staging that pushes the learner to *failure*, and

3. A simulation mentor for the learner.

Model: All too often in our real work environment we do not have a model for

success. A model is a recipe that identifies key variables and their interactions, and which can be monitored and tested regularly to see if it still holds true. Simulations are built on these models, or, as some might call them, storylines. Without one, a simulation has nowhere to go and fewer learning moments to share. Life in the real world is an experience in discovering working and non-working models.

Simulations compress these experiences into a situation that can be manipulated to produce maximum learning impact, without having to wade through many random events looking for one nugget of truth. Always ask for the model!

Failure Staging: I interviewed several producers of learning simulations and was surprised that *all mentioned failure staging* as a key element in great simulations. *Learning moments*, a term coined by Indeliq, are created for the student when she meets disaster and has to understand why and how to avoid it. This makes sense on many levels. Certainly our limbic systems stimulate significantly greater mental activity when we perceive the danger in failure.

But it is also more important to find out when we are off-track than when we are on course. A test pilot survives success, but seldom survives failure. How often does your supervisor come by to congratulate you for not failing on routine tasks? How often does the same supervisor come by to see you when you have made a significant and costly mistake? Forcing (or merely allowing) the learner to fail generates learning moments.

Failure staging can be problematic, however, and presents the counter-productive possibility that training will demoralize the learner. Practitioner Clark Aldrich (author of the simulation, VirtualLeader) feels that if failure staging is used, it should be used very judiciously. Clark's tempering of this aspect includes:

• Making mistakes recoverable, so as to avoid the message that failure is absolute, by allowing more rewarding recovery for more costly mistakes.

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FIGURE 1 Simulation types according to purpose.

• Ensuring that failures are not overly contrived and so make the learner feel an unrealistic sense of the dynamic.

• Making any semi-contrived failures occur early so that any sense of unreality dissipates over the course of the simulation.

• Segmenting failure staging in a way appropriate to the particular learner. That is, the architecture must ensure that different people fail at different rates and at different points for reasons having to do specifically with their own reactions, and yet always maintaining the possibility of a final failure state in the simulation.

Great simulations use failure staging, but demonstrate an awareness of its limitations.

Simulation Mentor: I will bet that whenever you have facilitated or attended a train-the-trainer session one of the guestions used early was, "Who was your best or most favorite teacher and why?" The responses usually evoke images of a person who not only knew the material, but who made the learning fun, mentored more than lectured, was always very attentive to your needs and guided you methodically and incrementally through tough learning sessions. A great teacher is someone who empathized and helped, not just graded vour guizzes. The hallmark of a great simulation is a well-developed artificial mentor like your favorite teacher. The mentor (sometimes I term it the mentor engine) must be as sophisticated (or more so) than its twin structural component, the simulation model.

Let's say you are doing a mountain

climbing simulation course and your primary rope has failed. You plunge until your secondary rope yanks your midsection and you find yourself dangling in mid-air hundreds of feet above the ground. This is a definite learning moment. You are panicky. Wouldn't it be nice if a combination of your mother and the finest climbing instructor had been observing and could magically float up next to you and calm you, offer advice and suggestions, and after talking you through your own rescue, calmly help you work through how not to do that again? Clearly this would not reflect reality, but the failure-mentor cycle is the key to the learning part of simulations.

Since this is such an important component, let me mention some other key elements of the mentor engine.

Context help on steroids: Clippit, the Office Assistant that came with early versions of Microsoft Office, could be set to pop up whenever you use a complex procedure. The mentor is like that, though good ones are far less annoying, more conversational and helpful. They can assess how you are performing in real time and, when appropriate, prod you to act, suggest alternatives, and provide useful information. Context-based information availability (information on demand) replaces the "shovel-ware" approach of much traditional e-Learning.

Motivate through anthropomorphic engagement: Humans are social animals. We simply are more motivated if we are doing something for a member of our troupe than for some abstract ideal. The mentor should be a character with whom we will readily form a bond, even to the point of wanting to please the mentor. As Bill Wiltschko very strongly suggests, *dramatic presence* is the key to a successful character whether a mentor or a protagonist.

Vehicle for scaffolding and fading: You will often hear the terms scaffolding and fading mentioned in connection with simulations. Scaffolding is the contextual and content support provided the learner in the simulation. Fading is the gradual reduction of this support as the simulation progresses. Remember when you were learning to ride a bicycle? First you had a tricycle or hot wheels. Then you moved on to a smallish bicycle with training wheels. Next came the experience of having a parent hold a real (no training wheels) bike while you climbed aboard, then getting a powerful shove down the sidewalk. And finally, you cautiously wobbled and wove down the street by yourself. By the next week you were probably doing wheelies and no-hands tricks.

Scaffolding and fading work like this. The mentor is the vehicle for this support. In the beginning that support may be frequent and content rich, but it fades out over the course of the learning activity.

Are simulations all alike? Making sense of what is offered.

Simulations are not all alike. They vary quite a lot according to purpose, complexity and price. All simulation-based e-Learning has learning as its basic purpose. However, the purpose of the learning from one occasion to the next can be quite different. I tend to categorize SIMBEL's into three basic types:

1. Those intended to develop *response* behaviors,

2. Those meant to help us use *decision aids*, and

3. Those meant to help us access *information and knowledge management* facilities.

Based on these purposes, here are descriptions of several types of simulationbased e-Learning. Figure 1 shows how they relate to each other. Of course, any particular simulation-based e-Learning product may build in of all these as elements.

Activity Simulations: Activity simulations have titles like, "How to fly an airplane" or "How to operate this vehicle". These simulations key in on job activities (whole and complex clusters of behaviors) that require rather expert information handling, reasoning, and motor skills to successfully

engage in the activity.

Soft Skills Simulations: Soft skills simulations differ from the activity simulations in that the object of the activity is not a machine, but another individual or group of individuals. Sales training, customer service, associate coaching, etc. are subjects that appear under this topic.

Process Simulations: How does an oil refinery work? How do we make widgets? These are the subjects of process simulations. They typically require and use models of the processes as the backbone of the learning experience. Learning takes place by following material and action on that material through the process. Major processes are modeled, but SIMBEL's can also be focused on specific sub-processes (e.g., filling out a claims form) or a specific task (how to tighten the bolts to the specified torque).

Business Simulations: Business simulations address issues such as competitive strategy or financial decisions. The simulation helps you learn how to make those decisions and will illustrate the likely outcomes of different approaches in a "whatif" fashion.

Software Simulations: This product oper-

ation training was probably the earliest kind of SIMBEL simply because the subject is so amenable to the technology. Examples include "How to Use a Spreadsheet," or "How to Mail Merge."

Product Simulations: Product simulations are reviews of a particular product meant to familiarize the learner with its components and functions. A SIMBEL about a new x-ray machine would be an example.

Causal (or Diagnostic) Simulations: Problem finding, troubleshooting, and root cause analysis SIMBELs are meant to help the learner develop a facility for finding solutions. Examples include those from the electronics and aircraft industries. Equipment malfunctions require a discrete action to remedy them, meaning less complex diagnostic branching models are used.

Which type does my organization need?

Good question! There are two issues you should consider in matching a simulation product to your needs. First, just as with traditional training, simulation needs can be matched with the type of product according to the nature of your business, the level of the target audience in the organization and the job competencies required. Some businesses are more technically focused (the widget factory), while others are more relationship oriented (a sales or customer service organization). And within each are positions from associate to supervisor to manager. Although admittedly a simplistic characterization of what might determine learning needs it nevertheless helps us select the type of simulationbased e-Learning to match those needs.

Individuals at the associate or line level in a more technically-focused business would likely be most interested in activity and causal simulations. Associates in more relationally-focused organizations likely need product, soft skills, and software simulations. Supervisors and managers in all types of organizations would find process and perhaps business simulations useful as well.

But there is a clear relationship between the type of e-Learning (traditional versus simulation) chosen and the nature of the needs assessment. In short, simulations raise in bold relief what we often categorize as organizational development issues. Traditional e-Learning does not scratch that

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deep. Hence, the sophistication of the needs assessment must change accordingly.

What became clear from several of the interviews with SIMBEL producers was what I call the "big issue" need and the "reality dilemma". Higher quality simulation-based e-Learning — custom training meant to address a specific work context — should address a key, fundamental, or high level need within the organization — the kind of issue that keeps the CEO up nights. Jim Christino and Les Spero of Strategic Management Group were most adamant when interviewed about this approach to identifying the need. Their

reasoning goes as follows:

Simulations are meant to mirror the reality of the job very closely. In fact, simulations created by a company called Simtrex, which develops simulation training for contact centers, so closely mirror the job that it's difficult to tell the difference between a real and simulated customer call. As we know all too well, our real organizational world is fraught with problems surrounding the clarity and reality of our vision, our mission, the sanity of our processes, our culture, our relationships and teamwork. Our workaday world is never pristine, and the typical workplace is not always an efficient,



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Bill and Kit are internationally recognized experts on the productive and appropriate use of new media and communications technologies. Bill is the author of numberous books including *Leading e-Learning* and *Using e-Learning*. focused, well-oiled machine.

Let's say we are designing a SIMBEL for Amalgamated Enterprises, the subject of the opening paragraph of this article. Do we teach the new administrative assistant the *ideal* way to operate at Amalgamated? If so, she would be dysfunctional from day one — she might be better off with no training. Or do we teach her to operate the way things really are at Amalgamated? Again, this may not be a great idea. She might acquire skills or learn ways to do things we would prefer nobody use! The point is that simulations are unique in the way they highlight or surface issues of process and culture in an organization ---problems that go to the heart of how that organization functions. When we look in that mirror we do not always like what we see!

As a result, learning simulation development is often a process of organizational development and change management consultation — with a significant need for leadership commitment — as much as it is an exercise in instructional design. And this means, quite often, helping that company identify and find ways to remove obstacles to better performance.

Again, some numbers are illustrative. In one case Christino and Spero implied a longish process of consultation and relationship development with a client. However, once it was decided what was needed, the actual simulation was produced in just six weeks. With a more traditional approach of job competency - skill gap assessment, then basic instructional design — the ratio of time and energy between needs assessment and course creation weighs most heavily on the latter. Often, especially in the case of custom or context specific SIMBELs, the opposite is the case. The needs assessment is intimately woven into issues of organizational development.

The upshot of this observation is that when considering the great leverage SIM-BEL can bring, you must also consider how it will impact the needs assessment process. The focus of that assessment should be on key or critical issues

Getting great leverage through blended implementation

Given the reality of SIMBEL and its closeness to the reality of the job, it makes sense that its greatest leverage comes with blended implementation and action learning. In fact, some of the greatest achievements of SIMBEL have occurred

where it was combined with face-to-face learning activities.

By blended implementation and action learning we mean the coupling of e-Learning with facilitated classroom sessions in which students apply and refine new skills whenever possible on real situations. Indeliq, for example, has reported some phenomenal results of the blended approach. In one case a control group received corporate finance training in the classroom only, scoring an average of sixtyfive percent on the assessment. When simulation-based training was blended with a classroom experience, learners achieved a ninety-three percent score on assessment with only a little over a third the hours invested in training! And, in another case, Imparta now offers a classroom sales seminar in which learners use a standard e-Learning simulation. This ensures consistency of approach across classes. Indeed during the interviews all producers reported increasing use of various forms of blended implementation.

Conclusion

The ROI of "Teflon training" evaporates like the morning dew. I know of no training mangers these days with open budgets. Most of us are under pressure to find the highest leverage learning experiences we can. Simulation based e-Learning holds the promise of causing learning to "stick." It also helps learners to move seamlessly from learning-by-doing to improved real job performance. But if you want to ensure that the simulation learning you acquire is going to serve that purpose, make sure it possesses these core characteristics:

• The product is immersive, involving the individual at a different, deeper learning level;

• The product forces behavior and reaction in a near real time frame, thus invoking more affective and intuitive responses;

• The product engenders a sense of reality;

 The experience replicates the job environment and focuses on real job behaviors and performance;

• The learning created is immediately applicable;

• There is a well-developed working model or storyline of that environment that can lead to successful outcomes;

• The design contains staging that pushes the learner to *failure*, but which does so in a very judicious and constructive way; and finally,

• The product provides a dynamic simulation mentor or scaffolding for the learner.

Follow these guidelines and you can be sure your next initiative will not just be a flash in the pan!

I want to give special thanks to Bill Wiltschko of eDrama, Daniel Hamburger and Brian Marcus of Indeliq, Richard Barkey of Imparta, Nancy Haines of Simtrex, Jim Christino and Les Spero of Strategic Management Group and Clark Aldrich of SimuLearn for their comments and help in producing this article. Any inaccuracies are my responsibility alone.

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If the topic appears to be of interest, we will ask you to submit an article. Refer to www.eLearningGuild.com for more details.



The eLearning Guild™ is a Community of Practice for designers, developers, and managers of e-Learn-

ing. Through this member-driven community, we provide high-quality learning opportunities, networking services, resources, and publications. Community members represent a diverse group of instructional designers, content developers, web developers, project managers, contractors, consultants, and managers and directors of training and learning services — all of whom share a common interest in e-Learning design, development, and management.

The eLearning Developers' Journal™

The Guild publishes the only online "e-Journal" in the e-Learning industry that is focused on delivering real world "how to make it happen in your organization" information. The Journal is published weekly and features articles written by both industry experts and members who work every day in environments just like yours. As an active member, you will have unlimited access to the Journal archive.

Guild Research

The Guild has an ongoing industry research service that conducts surveys on 20 topics each year. These topics are identified by the Research Advisory Committee. The data collected is available for all members.

Resources, Resources, Resources

The Guild hosts the e-Learning industries most comprehensive resource knowledge database. Currently there are over 1,350 resources available. Members have access to all of these resources and they can also post resources at any time!

People Connecting With People

The Guild provides a variety of online member networking tools including SIG Talk™ discussion boards, and the Needs & Leads™ bulletin board. These services enable members to discuss topics of importance, to ask others to help them find information they need, and to provide leads to other members.

It's About Leadership

The Guild draws leadership from an amazing Advisory Board made up of individuals who provide insight and guidance to help ensure that the Guild serves its constituency well. We are honored to have their active engagement and participation. The Guild has also established three committees made up of active members who help steer its editorial, events program and research efforts.

Discounts, Discounts, Discounts

Guild members receive discounts on all Guild conferences and on other selected products and services. Your Guild membership will save you 20% off the list price of Guild event!

Membership is Completely FREE!

Yes, FREE! All you are required to do is complete a membership profile form and you will have access to everything listed above ... and MORE! Join today at www.eLearningGuild.com!