



WHITE PAPER

CORPORATE TRAINING
USING 3D SERIOUS GAMES
AND 3D TRAINING SIMULATIONS

A REFERENCE GUIDE FOR TRAINING MANAGERS

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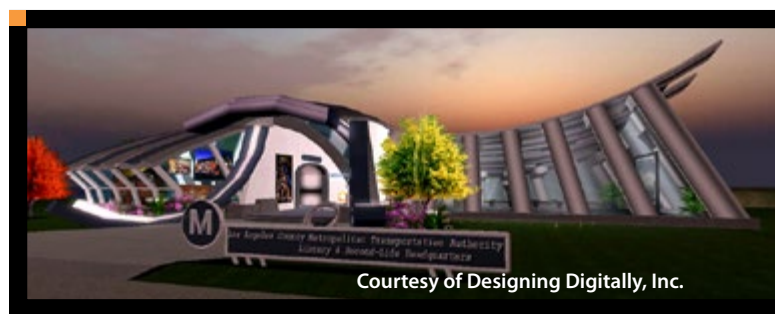
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CORPORATE TRAINING USING 3D SERIOUS GAMES AND 3D TRAINING SIMULATIONS – REFERENCE GUIDE FOR TRAINING MANAGERS

Training has always been an essential aspect of successful business operations, but it has become increasingly clear that training philosophies and standards have not adequately evolved over time. Much like the standardized educational methodologies employed in public schools, business training standards are mired in traditions that are just simply no longer well suited to the realities of today's learners. Fortunately, emerging technologies offer a way for business training to bridge the gap. The use of immersive 3D learning, whether through 3D training simulations, "serious games", or virtual worlds is rapidly redefining the way in which organizations carry out critical training operations, because these technologies offer superior performance enhancement, greater retention of knowledge, more efficient use of training resources, and greater pedagogical flexibility. This paper will explore the effective use of 3D serious games and 3D training simulations in the context of organizational training, as an emerging alternative to traditional training approaches.

INTRODUCTION

In today's markets, competition is increasingly fierce, whether it's the tech market, corporate operations, government services, or even education. Developing and sustaining a competitive advantage has become more challenging than ever before, but the need for such an advantage has not diminished at all. For this reason, organizations must do everything in their power to increase efficiency of operations, in order to maximize every advantage possible. One area where most organizations could stand to improve is in the realm of training.



Courtesy of Designing Digitally, Inc.

Every year organizations in all industries spend millions of dollars on training just to keep up with their competitors. In the 2010 State of the Industry Report developed by The American Society for Training & Development, a professional development magazine focused on workforce development, it was reported that the average expenditure for training outsourcing was \$257,871 in 2010¹. This was down slightly from an average of \$306,178 just one year earlier. However, by embracing new technologies it is possible for organizations to turn training into an

¹ ASTD. [2010] ASTD

advantage by actually employing superior training methods for a fraction of the cost of traditional methods. Organizations across the world are beginning to achieve this goal by embracing the use of computerized 3D learning environments such as 3D training simulations and 3D serious games to improve the effectiveness and efficiency of in-house training operations. Importantly, the market has shown that this approach is far from a typical tech-fad. In fact Serious Games Market Strategist Elaine Alhadeff estimates that as of 2008 the use of 3D serious games for training had already become a 1.5 billion dollar global market and will continue to grow.

WHAT IS A 3D TRAINING SIMULATION?



Courtesy of Designing Digitally, Inc.

A 3D training simulation allows a user to gain skills through carefully developed simulations of real world activities. These can be developed in virtual worlds or they can be built utilizing gaming engines. For instance, a 3D training simulation might model a corporate negotiation scenario, wherein one can choose between a variety of dialogue choices and strategies and have the simulation respond accordingly. This enables the user to acquire real life negotiation skills through direct practice, but without the potential cost or consequences that would naturally be associated with “experimenting” with real-world negotiations. Of course, this is but one small example of the use of such simulations, as will be covered next.

WHAT IS A 3D SERIOUS GAME?



A 3D “serious game” is somewhat similar to a 3D training simulation, but it incorporates a competitive experience. In addition to learning a skill or piece of knowledge, the user will also be called upon to use that skill or knowledge in order to overcome certain challenges. In some cases, the user will compete against pre-defined obstacles, but often multiple users will compete against one another to make the most effective use of the learned skills and knowledge. No matter how the game is set up, however, the purpose of a “serious game” ultimately lies in training and the effective transmission of knowledge that can then be used outside the game, in the real world.

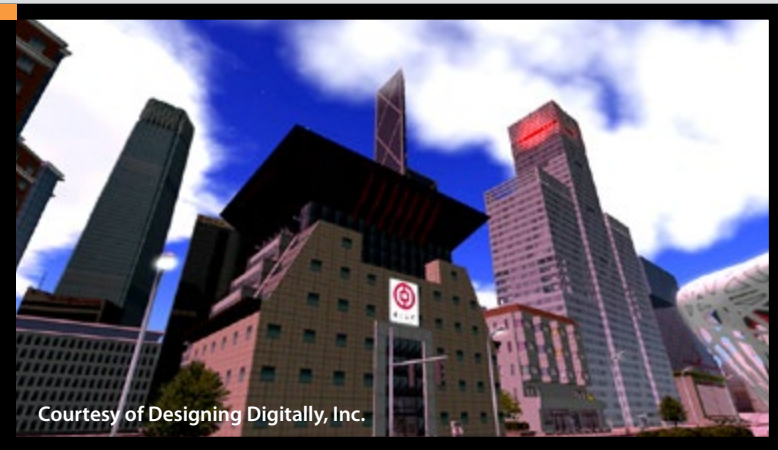
While still a shockingly innovative idea to many, serious games are beginning to be taken more seriously around the world, in all sorts of professional and organizational contexts. In 2002, the Woodrow Wilson International Center for Scholars, located in Washington, D.C., announced an initiative to develop serious games for the purpose of addressing critical training and policy issues in many D.C. organizations.² Elsewhere, Cisco has openly acknowledged the successful use of serious games in their in-house professional training operations and continues to be a major supporter of the technology throughout all industries.³

WHAT IS A 3D VIRTUAL WORLD?

Somewhat distinct from both the 3D training simulation and the 3D serious game is the 3D virtual world. A 3D virtual world is a computer-generated environment where the user is free to explore and interact in accordance with his or her own free will. These types of 3D virtual worlds

² eLearning Guild, 2012

³ eLearning Guild, 2012



include Opensim, 3D Virtual Campus Tours, Azivia, or Second Life, where 3D avatars representing each user can interact with one another in a virtual social setting, as well as manipulate elements of their virtual environment directly. In a 3D virtual world, the emphasis is not so much on accurate simulation or competition, but rather on delivering a sensation of immersion wherein the user truly feels as if he or she is part of the virtual world, as emphasized by global elements such as consistent physical laws, consistent topography, and so on. Like training simulations and serious games, 3D virtual worlds are also beginning to find their place in organizational training and learning.

SO, WHAT'S THE REAL DIFFERENCE BETWEEN THE THREE?



Moving forward, it is important that one is able to effectively distinguish between the three types of 3D environments used in 3D learning. All three have their unique properties that make them imminently suitable for different learning contexts. In general, however, the relationship can be expressed in terms of the emphasis which each experience delivers.

3D virtual worlds provide a focus or emphasis on experimentation and exploration in the environment. The experience is much more open-ended and individuals use their free will to determine how the experience unfolds. With 3D serious games there is more of a competitive element to the experience. The goals include the successful application of the knowledge and skills needed to meet the desired serious game learning outcomes. The 3D training simulation is very specific and allows users to practice the skills and decision making abilities needed in a virtual situation that mirrors the real world experience. Users will be exposed to the virtual consequences of their decision making to develop the correct use of skills and decision making in real world applications.

TO FURTHER UNDERSTAND THE DIFFERENCES BETWEEN THE THREE OPTIONS IT IS IMPORTANT TO CONSIDER EACH ON ITS OWN.

3D Training Simulations

Importantly, 3D training simulations don't emphasize winning. This means they are not fundamentally competitive like 3D serious games. Instead, their main purpose is to accurately model some aspect of reality and let one interact with that model in a trial-and-error fashion. For instance, a 3D training simulation for teaching nurses basic triage skills might model the environment of a triage setting and require the user to carry out activities such as setting a broken bone or drawing blood. If one were forced to "practice" these sensitive skills in a real life setting and failed, the consequences might be disastrous. Instead, by practicing them in a simulated 3D environment, failure becomes a useful learning experience, and one can practice until one gets it right. Of course, in such a context, it is imperative that the simulation is designed in such a way that the relationship between choices and outcomes is extremely accurate and believable; otherwise, the learned skills will not meaningfully translate to reality.

3D Serious Games

A 3D serious game also seeks to model some aspect of reality in a virtual setting, but typically does so for the purpose of providing a competitive challenge, rather than just providing free trial and error practice. For instance, one might learn a certain negotiation procedure, then strive against other users to see who can use that skill to

generate the most leads and sales within a given time limit. This competitive aspect deeply immerses learners in the process and is noted for boasting a very high rate of knowledge transmission and retention. Moreover, these games can be useful for teaching critical skills because the inherent competition provides an automatic measure of training effectiveness. Designers of serious games must be careful, however, not to let the game design outweigh the pedagogical intent, or vice versa; to be effective, a serious game must be fun and engaging as well as informative.

3D Virtual Worlds

The main point of distinction with 3D virtual worlds is that they contain no inherent “goal” for the user to achieve. Rather, they are something like a virtual sandbox, where one is free to interact and explore at one’s will, learning by experimentally observing the effects of different actions. For instance, a free-form chemistry lab virtual world might teach the user important facts about chemical reactions by allowing them to freely develop chemical mixtures and then accurately portraying the consequences. In these learning tools, the emphasis is primarily on experimentation and “seeing what happens”.

WHY IS THE USE OF 3D IMPORTANT?



While the above learning tools have distinct differences, one will note that they do share one fundamentally critical aspect with one another: they are all 3D in nature. The reason for this is that a number of emerging scientific studies have shown that traditional 2D training methods are just simply not as engaging to today’s learners as 3D. When one learns in a 3D environment, one is more immersed in the learning process, and is thus more likely to acquire and retain the lesson material than

one would by simply watching a 2D non-interactive training tool, such as a Power Point presentation. In short, anything but 3D training tools are in danger of losing the learner’s engagement.

The Importance of Engagement: Safety

In many cases, organizations engage in training because there are important safety considerations to be learned. Suppose that one were learning to drive a forklift and had to make a decision about whether a certain stack of palettes was too heavy or tall to safely transport. One is not terribly likely to recall the information presented on a Power Point slide referring to height and weight limits for particular models of forklifts. However, one is much more likely to remember the incident in which they attempted to lift such a stack in a 3D training environment, and it caused their forklift to fall over! By having “gone through the experience”, even in a 3D virtual context, learners simply retain safety-critical lessons better, reducing incidents and accidents for organizations.

The Importance of Engagement: The Bottom Line

Engagement and retention of training information is also crucial to the bottom line for the majority of organizations. Organizations don’t hold expensive training seminars for no reason; they do so because the information being taught is essential to carrying out operations in the most efficient and effective way possible. When one is linearly taught this information in a traditional method, one is likely to forget most of it. However, if one practices new techniques and procedures in a virtual environment, one is more likely to retain the experience, and the organizational training will have its desired effect as the new efficient and effective methods will achieve wider adoption.

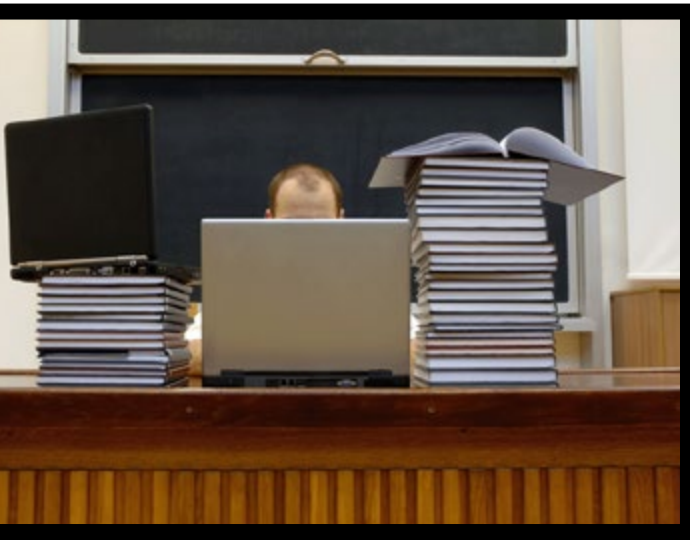
The Importance of Engagement: Ethics Issues

Ethics are some of the most difficult concepts to teach in a traditional learning environment. Traditional training may involve role play to allow the learner to actually “experience” the ethical issue. However, even at best, it is a very contrived situation. On the other hand, using a 3D learning environment allows the learner to become completely immersed in the ethical issue through the virtual experience. He or she is able

to experience what happens with both correct and incorrect decisions. This type of learning, including the ability to follow through on bad decisions, helps to reinforce why ethics are so important.

Ethics training becomes much more realistic and engaging for the learner through the virtual experience. This develops a more complete understanding of the ethical issues within the particular professional field.

DIFFERENT TYPES OF LEARNING



Of course, one should not take such a claim that 3D learning is “more effective” at face value. Rather, one should scientifically examine the veracity of such a claim through studies on effective pedagogical theory. Contemporary understandings of learning suggest that the reason why some pedagogical methods are more effective than others is because different people are uniquely predisposed to different learning styles.⁴ What works for one person may not necessarily work for another. This means that any given pedagogical approach to training is bound to have certain advantages and disadvantages, depending upon the extent to which the approach addresses a diverse variety of learning styles.

Visual Learning

One prominent learning style is “visual learning”. A visual learner is one who grasps and retains information best when it is presented in a visual fashion. For instance, if a visual learner were read a list of sales figures for different departments,

⁴ Aldrich, 2005

they may or may not be able to effectively recall this information when questioned about it five minutes later. However, if they were shown a visual representation of that data, such as a graph or chart that showed the relative sales for different departments, they would find it much easier to understand and remember. Learning tools such as graphs, charts, and Power Point presentations are traditionally geared towards visual learners.

Auditory Learning

Another major learning style is known as “auditory learning”. These types of learners grasp and retain information best when it is presented in a verbal or auditory fashion. For instance, if one read a passage of text describing different leadership styles such as autocratic, transformational, and transactional, then was quizzed on it five minutes later, an auditory learner might have difficulty remembering which label corresponded to which type of leadership. However, if they were able to hear the words spoken aloud, they would be able to differentiate them in a much easier and more effective fashion. Lectures and recorded audio material are learning tools traditionally associated with auditory learners.

Kinesthetic Learning

A third major learning style is “kinesthetic learning”. A kinesthetic learner does best at understanding and recalling information when he or she is allowed to interact with that information in a physical manner, utilizing the sense of touch. For instance, if one were required to memorize all the bones of the human body and were given a 2-dimensional drawing of a human skeleton labeled accordingly, this might work for a visual learner, but a kinesthetic learner would find it difficult to absorb and retain information from such a presentation. However, if he or she were given access to a 3-dimensional model of a human skeleton and allowed to feel the individual bones and observe firsthand how they fit and move together, he or she would find it much easier to retain the important information in question. 3D models and role playing are learning methods traditionally associated with kinesthetic learners.

3D Training Combines All Learning Types for Total Immersion

The true value of 3D learning can be understood best in this context: it combines all of the above

learning styles for total immersion that is effective for virtually all learners.⁵ When one engages in 3D learning, one is exposed to visual and auditory stimuli within the 3D training simulation, and the act of interacting with elements in the simulation provides the feedback that kinesthetic learners require. The result is that one effectively learns not by receiving, but by doing, which is referred to as cognitive learning.⁶ 3D learning tools such as 3D serious games are able to facilitate cognitive learning by appealing to all of one's senses and learning pathways and through providing direct simulation of the skill in question; this leads to direct performance improvement that is much greater than traditional 2D learning methods can offer.

Studies suggest that the use of such 3D learning methods is becoming increasingly expected by today's learners as well. The Federation of American Scientists reports, for instance, that a full 50% of Americans regularly play games; this is especially true for the younger demographic of kids 8 to 18 years of age, who routinely clock roughly an hour a day in video games. For this reason, today's learners are accustomed to receiving information from a variety of multimedia sources in a rapid fashion; if a learning exercise doesn't present information in such a way, they tend to become bored and disengaged. Today's learners also expect reward and gratification, as well as for their newly learned skills and abilities to be immediately applicable in a practicable fashion. These needs are met by the use of 3D learning tools such as serious games.

3D training models are not restricted to younger learners. In the paper "Computer-assisted training and learning in surgery", published in 2000 in the journal *Computer Aided Surgery*, it was found that combining simulation theory, principles of adult education and virtual reality was the most effective way to develop lifelong learning opportunities for surgeons that saved costs while enhancing skill development. In the book "Digital Game-Based Learning" by Marc Prensky the same trend was noted. The ability of the 3D training to take the learner out of a passive role and turn the learning experience into a user-centered and fun experience cannot be underestimated as a highly effective design and delivery method.

⁵ Aldrich, 2005

⁶ Aldrich, 2005

The Importance of Scenario-based Training

A good way to summarize the multi-level effectiveness of 3D learning tools such as training simulations and serious games is to explore the concept of scenario-based learning. Scenario-based learning occurs when one is called upon to learn some knowledge or skill by being placed in a scenario and required to act. This "learning by doing" facilitates the cognitive learning style that is so desirable when the information being disseminated is of crucial importance to an organization. It is clear to see how tools such as 3D training simulations can facilitate scenario-based training; for instance, one might use such simulations to experience what it is like to be CEO for a day in charge of fulfilling shareholder expectations, to be a politician in charge of making sweeping policy decisions, or to be placed into challenging and demanding ethical quandaries.

WHAT BUSINESS AND TRAINING PROBLEMS DOES 3D LEARNING FACE?



Having ascertained the reasons why 3D learning is so well recommended as a solution for organizations in need of an efficient and effective way to carry out training operations, one key question must then be addressed: what are the barriers to the adoption of 3D learning in the organizational context? To be sure, few things are adopted as new business standards without some major degree of resistance upfront. The following are a variety of ways in which existing business and

organizational standards might interfere with the adoption of 3D learning tools.

Resistance from Management

One of the foremost obstacles which 3D learning faces is resistance from upper management. The reason for this is simple to understand, but somewhat more difficult to redress as it tends to be cultural in nature. All 3D learning tools have the feature of interactivity, and even those that are not classified as “serious games” nevertheless have the appearance of “video games” to those not accustomed to the frequent usage of such new technology. Moreover, some in management might have the tendency to be dismissive of video games as mere toys and overlook their innate learning potential. Of course, many such individuals presently occupy the top leadership and managerial spots in companies and organizations across the world. It is only natural, then, to expect that they might have some resistance to the use of 3D learning tools.

Some 3D learning development and design companies like Designing Digitally, Inc., however, have worked to customize solutions that will ease the transition from traditional 2D to 3D learning in such a way that will alleviate the tensions felt by many organizational leaders, by converting existing 2D learning materials into their logical 3D equivalent. Such small steps are likely to be necessary in eventually gaining full adoption of 3D learning standards.

Complexity of IT Integration

Another level at which 3D learning might face resistance is from IT professionals. IT is another discipline, like pedagogy and management, which is mired in tradition. Things are done a certain way, and changes tend to be resisted because they have the potential to necessitate a great deal of effort to incorporate. They can also be quite disruptive to an organization's operations; for instance, one might recall during the late 1980s to 1990s, when organizations across the world began to shift away from terminal computers running proprietary software to computer networks that shared information and a common software architecture. It is the same for 3D learning; some may well view the adoption of 3D learning as an obstacle to overcome rather than an opportunity, as it can require new

forms of media and software to be reviewed and approved by organizational IT departments.

Increased Start-Up Costs

It would be remiss to not mention one glaring obstacle traditionally associated with 3D learning: it features a larger start-up cost than established 2D methods of learning. For instance, it is trivial to have someone in an organization develop a PowerPoint presentation that conveys key pieces of information and then project this presentation onto a screen in front of an auditorium. Organizations have been doing it for years, and it requires little to no capital investment. On the contrary, developing and integrating a customized 3D training environment such as a 3D serious game or a 3D training simulation will require a sizable investment upfront. At the very least, such tools do come with a cost and are not as easily developed as 2D presentations.

Psychological Disconnect Between Purchasers and Users

Another obstacle to the successful adoption and integration of 3D learning is that there is a strong psychological barrier between those managers and leaders who tend to do the purchasing of such tools and the end users who actually must make use of them in order to fulfill their job responsibilities. What one group wants may not necessarily be in the best interests of the other group, and consensus between the two is required if any real progress is to be achieved.

HOW CAN THESE PROBLEMS BE ELIMINATED?



Fortunately, the inherent benefits and qualities of 3D learning tools such as virtual worlds, serious games, and training simulations address many of these potential problems and obstacles directly. Over time, it will become clear that many of the obstacles are fundamentally temporary in nature.

Of course one of the biggest advantages to the use of 3D training technology is that it is cost saving over time. The upfront costs of the development of the 3D simulation will be offset with the ability to continue to use the simulation in trainings without the need for an additional expense. There are no additional costs for trainers, materials or travel, which is a real saving in any industry or organization.

Get the Target Audience Involved

Managers and leaders can ease the adoption of 3D learning technologies by actually getting the target audience, the end users, involved in the decision making process. Not only will this increase emotional buy-in towards the new training systems, but it will also allow managers and leaders to carry out diagnostic activities such as focus groups and surveys to best understand what it is that end users wish to experience in a truly effective training tool. Moreover, the otherwise problematic task of teaching individual organizational members to effectively use and interact with the new tools can be similarly addressed through open communication; users can report on the aspects of the new approach they find most alien or challenging, and training can develop organically as a result to address these particular concerns. This will greatly smooth the transition process.

Moving Forward, Thinking Outside The Box and Becoming Entrepreneurial

One piece of advice often given to managers and leaders who are looking to integrate new practices and policies into their organization in a way that works in coordination with the desires of employees, rather than against them, fostering organizational discord, is to move forward creatively and engage in calculated risk taking.

For instance, one of the biggest barriers to the adoption of 3D learning tools may well be a lack of understanding on the part of leaders and managers. Even though 2D traditional training methods are not inexpensive and it stands to reason that managers may be “prideful” of their

existing standards, which were likely rigorously developed over time and which are, in many cases, “good enough”. However, such managers would be well-served to adopt a forward thinking approach and look at the matter from the perspective of employees, who are really the ones being sheltered from a superior, fresh approach to training.

Additionally, pride might be at work in the trainer who rejects 3D learning on the grounds that it too closely resembles a “video game”. Such managers will need to embrace humility and recognize that whatever their personal feelings about games, the fact remains that the majority of their employees and followers are, as a result of their generational upbringing, intimately familiar with games and 3D interactivity. Therefore, it becomes a question of who the training is for. Trainers with the best interests of their employees in mind will not let pride stand in the way of doing what is best for them and will consider their opinions greatly in determining just what the best approach is.

Trainers must also be willing to think outside the box and use entrepreneurial skills in that they must be willing to take on risks and embrace innovation when the situation demands it. Many managers run the risk of falling into a rut wherein traditional training is perpetuated simply because it is “good enough,” and they worry about the expense associated with adopting a new system. After all, what if the new system isn’t as good as the old one? The expense would have been in vain. However, no organization ever grows or develops without embracing change, and studies indicate that 3D serious games and 3D training simulations are the way of the future in regard to effective interactive training. Without taking certain risks, growth simply isn’t possible, and without growth, one cannot have or sustain a competitive advantage.

Lastly, a trainer must be effective in his or her approach to adopting new systems. Even if a manager embraces the value of 3D training tools, he or she might still have difficulty in making a wise decision about who should develop such tools. Indeed, many of the foremost experts in the field of 3D learning development and design are young innovators, who may not be trustworthy in the eyes of experienced well-seasoned trainers. However, new technologies require a fresh approach, and managers should not hesitate to trust in the expertise of such

innovators, provided that they can provide demonstrations of the quality of their designs.

Ease Transition by Gamifying Existing Content

Overcoming the hurdle of transitioning from 2D to 3D teaching tools can be difficult, and those organizations that are able to do so successfully are often those who undertake the transition gradually and iteratively. As mentioned above, Designing Digitally, Inc. is an innovative 3D training design company that offers a service intended to “gamify” existing training content. For instance, old PowerPoint presentations can be converted into 3D experiences rather than thrown out. Old methods of direct linear learning from charts and graphs can be turned into immersive competitive experiences in which leads and sales translate into point values. The possibilities are limitless and less likely to face significant resistance when the shift is gradual.

Justifications for Increased Startup Cost

Lastly, while the investment required to first transition an organization to 3D training tools can be high, one should certainly regard this as a true “investment”; that is to say, one which will pay off in the long run. The upfront expense has historically caused some firms to attempt to design and develop their own 3D training tools, but when compared to the development of tools by professional qualified 3D E-Learning companies, the return on investment is much lower.

Those organizations that go with a professional 3D E-Learning company are able to draw upon the expertise of such companies to ensure the development of effective 3D training. We are one such company. At Designing Digitally, Inc., our software modules, virtual worlds, and simulations are developed not just in accordance with software standards but also to the highest pedagogical

standards. We pride ourselves that best practices are upheld at all times and most importantly, that one’s return on investment is not just realized, but maximized. Being confident in ROI is one key way to overcome resistance to the adoption of new standards in training.

DO 3D SIMULATIONS AND 3D SERIOUS GAMES REALLY PROMOTE LEARNING?



One of the biggest concerns which businesses tend to have about 3D training simulations and serious games is whether or not these tools will really represent a qualitative improvement in learning over traditional solutions which are already implemented. One should rest assured that these tools do indeed promote learning in a variety of multifactorial ways. While they may bear certain resemblances, 3D serious games, virtual worlds, and 3D training simulations are not mere “video games”, but rather carefully engineered training tools that utilize the experience of interactivity and fun into order to maximize the pedagogical advantage of the tools. In other words, the existence of “fun” in these tools is not intended just to sweeten a bitter draught; it is actually an integral part of the training design that fundamentally makes the training more effective. These methods have proven so reliable in promoting and facilitating learning that most modern instructional design directly implements a core 3D learning element in some way or another.⁷ To put it another way, 3D learning is so effective, it’s fast becoming the industry standard behind the scenes.

⁷ Kapp & O’Driscoll, 2010



THE FOLLOWING ARE THE KEY WAYS IN WHICH 3D LEARNING PROMOTES LEARNING OVER TRADITIONAL METHODS:

Psychological Benefits

First and foremost, the use of tools such as 3D serious games takes advantage of the basic human drive to compete with one another.⁸ While some may view competition as antithetical to the development of a productive and effective team, evidence suggests that the opposite is actually true. Friendly competition between team members can actually build cohesion and mutual respect through sparking meaningful social interaction between members in the context of the competition. Moreover, having regular competitions at which all members have an equal chance of succeeding boosts morale and fosters many skills which are critical to successful business operations. This holds true no matter what industry one is in, such as leadership ability, open communication, and creative approaches to problem solving.⁹

An additional psychological benefit imparted by competition such as that facilitated by 3D serious games is that it removes the training from the context of “learning”. Many people have a fear of learning or experience anxiety when they feel they are being tested. By situating the training and testing in the context of a game, people will tend to feel more at ease and can forget their anxieties, focusing more on successfully internalizing the necessary knowledge and helping to build a winning team.¹⁰

Still others are simply disinterested in learning. This may be caused by job fatigue where an employee doesn't see the benefit in taking time out of their busy schedule to participate in training. This feeling of having too much to do to participate in training creates a negative feeling towards traditional types of professional development and learning. The gaming experience of 3D serious games removes this issue and creates a fun, engaging and highly interactive learning experience that makes training something to look forward to.

Experiential Benefits

Another powerful effect of using 3D learning tools such as 3D serious games and 3D training

⁸ Beck & Wade, 2004

⁹ Beck & Wade, 2004

¹⁰ NAGASA, 2012

simulations is that they can help to make abstract concepts more concrete for the user. What this means is best explained by example. Suppose that one were told simply that “quick thinking in emergency situations is vital”. This is entirely true, but it's just simply not very impactful, and the learner isn't likely to remember and internalize the advice, or at least not in a practical way. Suppose, however, that this same lesson is taught by subjecting the learners to a 3D simulated scenario wherein a coworker suffers a traumatic injury, and the team must respond appropriately within a given time frame in order to save the co-worker's life. Even in a simulation this is a stressful experience, and successfully completing such a scenario will not only build confidence, but it will also drive the point home much more successfully. The learner is much more likely to remember how he or she reacted in the emergency situation and then be able to overcome the stress and quickly apply that learning to a real life emergency should one ever occur. In this way, the use of 3D learning has taken something abstract, “quick thinking,” and made it into a concrete experience for the learner.

HOW CAN 3D SIMULATIONS AND 3D SERIOUS GAMES BE USED FOR TRAINING?



Having covered all the ways in which 3D training tools can facilitate learning, one might explore some of the ways in which these tools can be practically applied to training. As mentioned above, 3D training simulations are based on a trial and error model. To continue from the same example just given, if a simulation involves a scenario in which a co-worker has lost a limb in an industrial accident, learners will have the opportunity to

repeat the scenario until they have a comfortable understanding of how best to carry out proper safety protocol. It is easy to imagine that in the first trial with such a scenario, the learners might fail to respond in time to save the life of the injured co-worker. In a simulation, the experience can simply be re-tried with no real harm done. If one waits until real life to try to put safety protocol into practice, the results of failure can be deadly.

Of course, there will be some areas in which the simulations differ from real experience, but this actually improves the strength of the training exercise, rather than diminishes it. Ultimately, the use of these 3D learning tools is not about creating an imperfect modeling of reality in 3D and should not be viewed this way; instead, they are about creating an enhanced physical space where one can do things that one cannot do in reality, for the sake of making learning more effective.

3D Training Simulations – Case Studies

3D simulations have been successfully used for training in a variety of industry scenarios, many of which will be described below. One example is the “Trauma Unit Nurse” 3D training simulation developed by Designing Digitally, Inc. This simulation is intended to help nurses learn basic trauma skills such as administering IVs or setting broken bones by practicing them in a realistic simulated scenario. The simulation also strives to emulate the sense of pressure that a trauma nurse would face by introducing time limits and other factors during the immersive scenario simulation. The result is that nurses who train with the simulation are better prepared for handling the stresses of carrying out trauma care in real life.

Nursing wards which have made use of the “Trauma Unit Nurse” 3D training simulation are able to confirm the effectiveness of the program because it makes use of SCORM tracking that records stats into an organization’s Learning Management System (LMS). The SCORM system is able to track pass and fails, tries attempted, time spent in the simulation and also points for each user.

3D Serious Games – Case Studies



Courtesy of Designing Digitally, Inc.

3D serious games have also been used effectively in training scenarios. For instance, a state funded housing authority agency charged itself with educating young adults on the important realities of managing their debt wisely in contemporary recession-ridden America. Rather than teach this vital knowledge through a seminar or through some means where it would largely be ignored, the agency chose to contract Designing Digitally, Inc. to create a 3D serious game wherein the user plays the role of an individual who has entered the “real world” and must successfully manage their expenses in order to avoid having their debt go beyond their means and ability to handle. This game reflects the true reality of debt handling by providing a realistic simulation of the fluctuating economy, including ups and downs and random setbacks, just as one would face in real life. Because it’s a series of serious games, however, it contains the competitive element of having to achieve certain goals such as obtaining a mortgage, while keeping one’s finances afloat. By directly interacting with such a realistic scenario, students are better able to internalize the lessons of the training and are thus better prepared to handle debt in real life.

3D Virtual Worlds – Case Studies

Freeform 3D virtual worlds have also been successfully used in different industries for training purposes. Clearview Recovery Center is



Courtesy of Designing Digitally, Inc.

a rehabilitation center that treats those suffering from drug and alcohol addiction. The center recognized a core deficiency in their operations; they had no viable means by which to continue providing support and treatment for patients once they left in-center care. After contacting Designing Digitally, Inc., Clearview instituted a virtual world environment wherein patients can log in and explore a realistic 3D simulation of the Clearview Recovery Center, complete with classrooms, meeting places, and outdoor areas. Here, they undergo group therapy from home with other users who sign in and meet with counselors in the virtual environment. Since instituting this training vehicle, Clearview has enabled patients who have left the facility to continue with their treatment and improve their treatment outcomes over the long term.

Designing Digitally, Inc. was also selected to work with the United States Air Force Academy to create a comprehensive, immersive web-based virtual replica of their campus in order to provide tours of the campus. The project was developed to prevent the need for potential cadets to fly into Colorado to explore the campus.

A live guided tour system allows potential cadets to follow an admissions representative around as he or she gives a tour of the campus based on the potential cadet's interests. Included in the tour are clues and trivia, games, a virtual currency system, custom built avatars and apparel, and photorealistic 3D replicas of the base. This virtual world experience has allowed for USAFA to provide familiarity to potential cadets and showcase some of the best features the Academy has to offer.

WHAT INDUSTRIES CAN MAKE EFFECTIVE USE OF 3D LEARNING?

The above examples represent just some of the flexible utility offered by 3D learning programs. In reality, virtually all industries could effectively put 3D learning to use in order to facilitate superior training and secure a competitive advantage through greater efficiency. The immersive nature of the 3D environments of such programs makes them uniquely suited to modeling the needs of any organization.

Below are some examples of the use of 3D simulations, serious games, and virtual worlds, in a wide variety of industries.

Pharmaceutical Industry

Sales in the pharmaceutical industry is a somewhat unique process in that it involves salespeople talking directly with doctors in an effort to persuade them to adopt the practice of prescribing certain medications (the only direct way to facilitate sales of a prescription medication). This is often a difficult task, as salespeople have to be well-versed in the respective virtues and fallbacks of any given medication and must be able to respond to the varying needs of different physicians in order to close a sale. By modeling the salesperson – physician interaction in a 3D simulation environment, some pharmaceutical companies have been able to more effectively train salespeople to flexibly deal with the huge number of variables inherent in any pharmaceutical sales transaction.

Oil Industry

Energy companies, especially those in the oil industry, have also profited from the adoption of 3D learning tools for training. For instance, Irving Oil has historically run a program for fostering leadership experience and core business competencies in organizational members as a means to farm future leaders and managers in-house. In the past, this was a costly endeavor, as it often required sending representatives to various areas to carry out training with candidates. More recently, however, Irving Oil has adopted the use of 3D training simulations in order to disseminate their leadership training virtually; the result is that leader candidates receive the same training, through superior means, at less cost to the company.¹¹



Courtesy of Designing Digitally, Inc.

¹¹ CLO Media, 2012

Medical Settings

Health care giant Humana has famously made use of 3D training simulations for unique purposes. As the company is charged with developing health policies that balance the interests of doctors, hospital administrators, and insurance agents, they have used simulations in order to “try out” different policy approaches in a realistic simulated environment. This use of the “trial and error” function of 3D training simulations has enabled Humana to accurately determine the effectiveness of various policies and plans before instituting them, saving the company untold sums of money through preventing real-life failures.¹²

Government Settings

Government settings have also proven to be fruitful ground for the use of 3D training tools. The Internal Revenue Service, for instance, began to implement a virtual training system in the late 1990s, under the directive of President Clinton. The reason for this was that the organization employed some 100,000 employees charged with carrying out tasks in accordance with a massively confusing and labyrinthine tax code. The result was that the efforts of these employees were far from consistent, and organizational output was varied and inconsistent. Virtual training through 3D training simulations was used in order to disseminate key training messages to all employees in a cost effective and efficient fashion.¹³

The military is another major user of 3D training. Famously, the organization has utilized interactive training simulations developed by companies such as Designing Digitally, Inc. in order to help soldiers develop strategic skills and attain mastery of complex procedures and protocols; this is important because of the critical nature of operations carried out by the military. Failure in a simulation is far preferable to failure in the field during a vital operation when lives are at stake. Moreover, soldiers routinely have to deal with complex ethical dilemmas. By presenting these dilemmas in interactive 3D training simulations, the military can ensure that soldiers are well prepared to deal with these challenging scenarios and achieve the best possible outcomes. There are multiple conferences every year for companies

¹² CLO Media, 2012

¹³ CLO Media, 2012

that provide these types of 3D training simulations to the military such as Gametech and IT/ITSEC. These conferences provide a glimpse into the future learning experiences for the military, much of which is in 3D using training simulations, virtual worlds, and serious games.

WHAT ARE OTHER WAYS OF USING 3D TRAINING SIMULATIONS & 3D SERIOUS GAMES?



Courtesy of Designing Digitally, Inc.

Ethics Training

Ethics are an important part of all businesses in the 21st century when corporate social responsibility is such a major concern. In the same way that policies and strategies can be given a “trial run” through the use of 3D training simulations, ethical decisions and stances can be subjected to the same scrutiny. Learners can experience complex and challenging ethical dilemmas and observe the potential outcomes of various responses in a safe and structured environment. This ensures better results in practice and provides employees a clear line of appropriate and inappropriate behaviors in the workplace.

Culture Change

Culture change is one of the most challenging ordeals any organization can undertake. It requires

a total organizational shift in thinking from the top down, beginning with the upper level leaders and ending with each and every employee. Ameren Missouri, an electricity and gas company serving some 12 million customers, wanted to undertake a cultural change to improve their reception among their customers. To achieve this goal they developed a virtual customer feedback program, wherein feedback from customers is automatically delivered to a “web insights navigator”, where leaders can explore, in the context of a simulated environment, which pieces of feedback are most vitally relevant to their particular areas of responsibility.¹⁴ In doing so, each leader has a direct understanding of what needs to be achieved to facilitate a culture change towards customer satisfaction and can foster these changes both in themselves and in followers.

In light of the information-sharing culture that emerged in the early 21st century with such knowledge sharing repositories as Wikipedia, Sun Microsystems sought to redefine its company culture away from core values of developing and hoarding valuable proprietary information, to sharing that information for the benefit of the industry as a whole. To facilitate this change, they developed a 3D serious game, “Rise of the Shadow Specters,” which uses an immersive science fiction story to provide concrete examples of the differences between a culture that hoards information and a culture that shares information. The project was successful enough to prompt Sun Microsystems to develop a sequel, “Dawn of the Shadow Specters”.

Corporate Training

Of course, basic corporate training exercises are also well-served by the use of 3D training tools. For instance, the financial firm Nomura has adopted the use of 3D serious games to assist in new hire training by finding potential job candidates who possess the skills and values the company looks for and develops in their employees. Moreover, they have augmented their global speaking series with the use of 3D training simulators so that employees can receive expert training globally, without incurring the costs associated with traditional in-person training.¹⁵

Hasbro, the toy manufacturer, has made use of 3D simulations in order to model different global markets around the world and then practice

¹⁴ CLO Media, 2012

¹⁵ CLO Media, 2012

effective leadership and branding strategies in these different contexts in order to establish what strategies would be most efficacious. This has aided the company in gaining worldwide recognition in the toy market due to effective branding strategies.¹⁶

Enhancing Corporate Relations

Corporate public relations have also been improved through the adoption of 3D training tools. For instance, some universities have contracted companies like Designing Digitally, Inc. in order to produce 3D virtual campus tours, where users can explore an exact digital replica of a school’s actual campus, right in their web browser. Research firm Noel Levitz recently established that a full 24% of polled college applicants stated that they would no longer consider a school if they had a bad web site experience; 51% of those applicants said that not being able to find the information they wanted would constitute such a “bad web site experience”. The use of 3D virtual campus tours is an innovative way to get information into the hands of users in an immersive and powerfully persuasive way. Clearly, such a use of 3D simulations and virtual worlds could be applied to other businesses as well.

3D learning tools have been used for the academic side of matters as well, not just the corporate side. Harvard, for instance, has famously used Second Life, a popular 3D virtual world, to hold interactive online classes, taking advantage of the unique editable features of the Second Life world in order to enhance the pedagogical approach.



¹⁷Designing Digitally, Inc. has used 3D models to augment learning at Marshall University and Florida International University, as well as over 30 additional campuses, with great results.

HOW CAN THE SUCCESS OF 3D LEARNING BE ENSURED?



Naturally, companies that adopt the use of 3D learning have every right to question whether or not such measures will really provide a qualitative advantage to the organization. By no means should any organization adopt 3D training and simply assume that the results it produces are an improvement; rather, one should always measure such matters to achieve a fuller understanding.

Use of Analytical Data

One of the most direct ways to measure the success of 3D learning programs is through the use of analytical data. 3D serious games and training simulations coded by qualified vendors of 3D training tools such as Designing Digitally, Inc. contain SCORM coding routines, which allow administrators to track a variety of different options within the game or simulation. Data such as time spent in the simulation, as well as what skills have effectively been passed can be accessed, and the relative efficiency of the 3D training can be compared to the known efficiency of past traditional 2D methods. In this way, one can see firsthand which method provides superior results.

¹⁷ Learning Matters, 2012

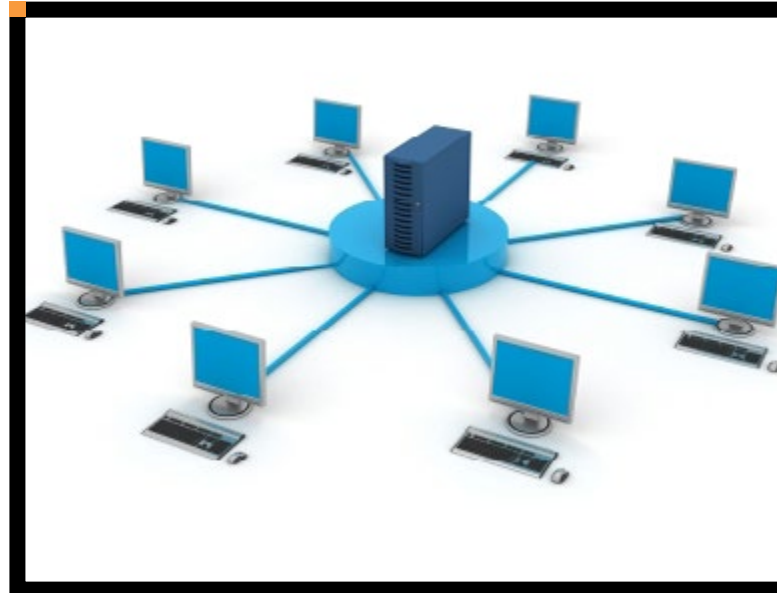
Use of Surveys

A more qualitative approach to ensuring the success of these programs is to make use of surveys. Employees can be surveyed as to their training experiences with the 3D programs, as well as past 2D approaches if applicable. The sum of employee responses will give leaders a valid image of not only how well the organization has accepted the 3D tools, but also how much they have gained by doing so.

Track Records

Of course, not all of the burden of tracking the effectiveness of 3D training utilities need reside with the organizations themselves. Organizational leaders would do well to ask potential 3D learning vendors for track records of past projects and successes. This provides a concrete record of the reputation a company has, which is important, because a vendor should not just be trained in 3D animation, but also well versed in pedagogical technique so that the developed 3D games or simulations are not just immersive, but pedagogically effective.

HOW WILL 3D LEARNING SYSTEMS BE DELIVERED TO LEARNERS?



3D learning systems represent such a major paradigm shift from traditional 2D training that organizations will naturally be curious about delivery methods. This is especially true if an organization has been carrying out training primarily developed in-house such as PowerPoint presentations, rather

than going through an outside vendor. The following points will clarify some of the questions regarding how 3D training will be disseminated.

No Need for a Major IT Overhaul

The first and most important point to make is that fears of having to institute an entire IT overhaul in order to accommodate 3D training are unfounded. Indeed, the 3D virtual worlds, training simulations and serious games can be embedded into basic internet browsers, such that learners can use software already on their systems to access the training experiences. However, depending upon the technology adapted by the organization, there will be times when additional software must be installed. If the agency, along with the chosen vendor, does its homework it can find solutions that are creatively built without having to redevelop the infrastructure already in use. Companies such as Designing Digitally, Inc. develop 3D virtual worlds, training simulations and serious games that have minimal technology adaption to help the IT infrastructure rather than hindering it. This is used to track and manage the performance records and SCORM scores of individual learners for the purpose of verifying effectiveness and diagnosing organizational needs.

Expansion to Portable Devices

The portability of 3D training that is accessible through a web browser is certainly a major draw. What is more impressive, however, is that many 3D training tools will be accessible from browsers not only on computer systems, but over tablets such as the iPad, and smartphones such as the iPhone and Android phones as well. This allows for ultimate flexibility in how the training is disseminated throughout the organization. At Designing Digitally, Inc. we are on the cutting edge of developing these “learning on the go” technologies. Employees can access 3D training without having to be tied down to a computer, adding to the versatility and cost effectiveness of 3D trainings that are browser based.

Hybrid Classrooms

Speaking of flexibility, the delivery of 3D training systems is such that organizations can also utilize it in a hybrid fashion. For instance, trainers can combine a physical classroom presence with the virtual tools in order to create a robust training experience where 3D simulated training

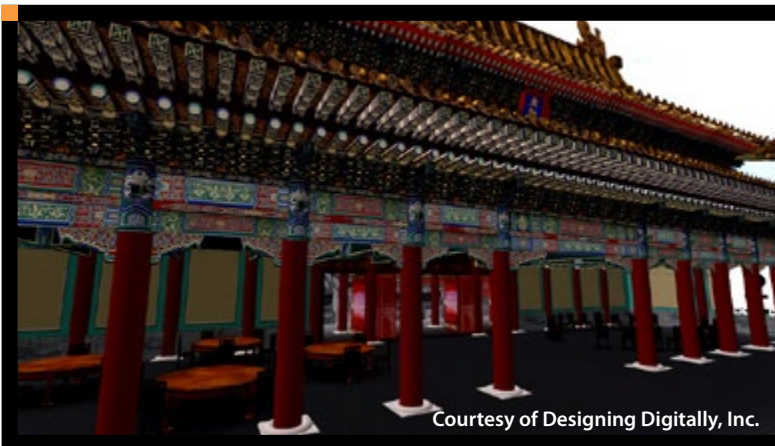
experiences are discussed and extrapolated into the real world through face to face interaction. In this way, the best of both worlds can be achieved.

Stand-Alone Tools for In-Field Learners

As a last element of the flexible dissemination of 3D learning technologies, many of these tools can be transmitted to remote locations for learners in the field. For example, if a sales representative is traveling to a remote location and requires training in local customs, he or she can access such training remotely, while still enjoying all the robust benefits of 3D learning outlined above.

In short, 3D learning and training can be disseminated in a variety of different ways; how it reaches the end user is ultimately up to the discretion of the organization and their particular training needs.

WHERE DOES THE FUTURE OF 3D LEARNING LIE?



Courtesy of Designing Digitally, Inc.

3D learning is certainly the future of organizational training, but one might fairly ask where its own future lies. Knowing where 3D learning is going in the future can help one make wise decisions about how to effectively deploy it today.

Increased Immersion and Virtual Reality

The true value of 3D learning is primarily driven by the greater immersion which the 3D learning experience offers, appealing to all learning styles and providing a more hands-on approach to problem solving. In the future, this degree of immersion will only grow. As 3D models and environments continue to grow in fidelity, they will become more and more realistic and indistinguishable from reality.

More Intuitive Controls and Feedback

If there is a barrier to widespread adoption of 3D training tools, it would be the complexity that the controls sometimes demand. While trainers can confidently teach the basic keyboard and mouse controls to users in a matter of an hour or so, the future will see developments where control and feedback become even more intuitive. This trend can already be seen in the emergence of technology such as motion detection games on the Wii, PS3 Move, and Xbox Kinect systems, as well as the ubiquity of touch and voice controls on smartphones such as the iPhone.

As these more natural means of control become the dominant means of interacting with computers, the control systems used in 3D simulations, virtual worlds, and serious games will become more fundamentally intuitive, and their instructive value will only grow as a result, due to greater immersion.

Greater Cultural Acceptance

Cultural acceptance of 3D learning tools can only be expected to grow, as well. This is due to the fact that the primary users of video games and 3D technologies belong to the younger generations, and over time these 90 million young people will grow up and attain top level jobs as organizational leaders. When they do, cultural resistance to the use of “games” as learning devices can be expected to greatly diminish.¹⁸

¹⁸ Beck & Wade, 2004

The Distant Future

Of course, decades into the future we may well see technologies that will supplant even 3D training technology as the ultimate in immersive training experiences. For instance, the use of nanotechnology in animals may yield discoveries that allow for the careful manipulation of events on the molecular level, a world-changing technology that will surely have ramifications for training and skill development as well. One can easily envision a system wherein one controls a simulated virtual reality training exercise entirely through thought and neurological triggers; indeed, scientists have already achieved this with animals! The future of learning is nothing if not exciting.

CONCLUSION

In conclusion, 3D learning technologies such as 3D training simulations, 3D virtual worlds, and 3D serious games are no longer just a fringe technology on the outskirts of industry; they're paradigm-changing approaches to learning that are here to stay. Already, they have been successfully used in industries as varied as nursing, energy, and military operations. As the future of globalized industry becomes increasingly competitive, those organizations which are able to efficiently leverage the full value from employees will be the organizations which succeed in the long term, and 3D learning is a key way to achieve exactly such an outcome.



Courtesy of Designing Digitally, Inc.



Courtesy of Designing Digitally, Inc.

Those organizations that adopt early are the ones that will stand to derive the greatest competitive advantage. If you'd like to discuss more about 3D learning technologies, or the possibility of having your own custom 3D training tools developed for your organization, please don't hesitate to contact us at:

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We look forward to serving you, and helping you make this transition into the future!
Until then, have a creative day!



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