Chapter 14

Adopting Virtual Worlds in ADL: The Criticality of Analysis

Keysha I. Gamor

The ADL Initiative develops and implements e-learning technologies across the U.S. Department of Defense (DoD) and federal government. In collaboration with government, industry, and academia, ADL promotes international specifications, standards, and best practices for designing and delivering learning content that leads to effective, meaningful training. In doing so, ADL uses technology to bridge the gaps created by distance, time, and space.

As with e-learning, ADL has a responsibility to assist DoD and the federal government with identifying technologies to address current and future training or educational challenges. DoD and other agencies throughout the federal government seek to employ technologies to deliver sound content efficiently and economically and increase access to DoD and federal resources.

Given the broad goals of ADL and its vision for high quality, on demand learning, it is understandable that DoD, the federal government, and thus ADL, all have a keen interest in immersive e-learning environments, such as the computer-based simulated environments called virtual worlds (VW) and the capabilities they may afford the training and education industry. Hype aside, there are good reasons to be interested in virtual worlds. The E-Learning Guild (Whiteside, 2002) offers three main justifications for considering immersive learning environments: to increase learner motivation; to support high-level, performance based learning outcomes; and to increase transfer of training to the job environment.

This chapter discusses the characteristics of virtual world technology, the hype around virtual worlds, and some critical considerations to take into account before purchasing a virtual world platform. In the context of the ADL business paradigm, the chapter illustrates the pull of the Instruction and Pedagogy line on the requirements for interoperability (Wisher, this volume). In particular, this chapter addresses the careful analysis needed before embedding virtual worlds in a learning environment consistent with SCORM requirements (Gallagher, this volume). In view of the tremendous creativity in the virtual world community, it is impractical to expect developers to abide by a "standard" for virtual worlds just as is the case for game developers (Xu, this volume). Other means, such as, for example, service oriented architectures or data models to communicate between a virtual world and a learning management system could be used. From an ADL perspective, the learning experiences with virtual worlds must be consistent with the needs for accessibility, interoperability, and reuse.

What are Virtual Worlds?

There is no single, agreed upon definition of "virtual world." However, all definitions acknowledge that a virtual world is an online simulation of either a real or fantasy world environment populated by avatars, which are pictorial or graphical representations of the human participants. A virtual world can also be described as "a synchronous, persistent network of people, represented as avatars, facilitated by networked computers" (Bell, 2008). EDUCAUSE, a non-profit association concerned with leveraging technology to improve higher education, defines a virtual world simply as an "online environment whose 'residents' are avatars representing individuals participating online." (The EDUCAUSE Learning Initiative, 2006). Still, other definitions which address the specific affordances of this modality help us understand the potential of the technology as well. Examining popular virtual world applications can help frame an understanding of virtual worlds as "online 3-D virtual worlds … within which residents are able to establish identities (avatars), explore, create and communicate. [Further, a virtual world may] lend itself well to social networking, collaboration and learning" (Institute of Electrical and Electronics Engineers, 2009).

Avatars

The Association of Virtual World's Blue Book helps novices get started in virtual worlds by first explaining what an avatar is: "'Avatar' comes from Hindu mythology and means the incarnation of a divine being. But in the virtual world an avatar is an icon or representation of a user (Association of Virtual Worlds, 2008)."

In a virtual world, however, the avatar is also both a navigational and experiential tool. With the avatar being a representation of self, learners ascribe a personal connection that enables them to engage in the virtual space as an extension, alternative, or augmentation of the real world. Thus, we see the adherence to social norms and behaviors, such as observance of personal space, "eye" contact, attention to appearance, emotions, gesturing, etc., typically seen in face-to-face interaction.

While the use of avatars in virtual worlds is the standard method of navigation and interaction, there is currently no standard definition of virtual worlds in general. Therefore, it is important to examine the commonalities among the available virtual world platforms to help frame a conceptual understanding of what virtual worlds offer beyond what our current instructional design toolkit provides.

The Evolution of the Virtual Worlds Industry

The concept of virtual worlds as a collaborative learning tool is not new. In fact, three-dimensional (3D) virtual worlds have been around since 1995, with one precursor, Multi User Domains (MUDs), dating back to 1978 (Jackson, 2007). The pace of development began to accelerate in the mid-1990s on multiple fronts. Since 1995, there has been a series of new launches of virtual worlds, ranging from virtual worlds

prototypes on through the first release of Second Life, currently the most used virtual world, in 2003. Second Life is used for many different purposes, including community-building and games, but also for business collaboration and for educational purposes.

Early on, the concept of virtual worlds was also explored in science fiction novels such as *The Three Stigmata of Palmer Eldritch* (1965), *Neuromancer* (1984), and *Snow Crash* (1992), and in popular films which led to film sequels and launching a mini-industry of movie-themed comics, video games, and animations as well. The launch of AlphaWorld (1995) signaled the beginning of a new era in virtual worlds by providing a Web-based, collaborative virtual environment. Mega hits like EverQuest (1999) and World of Warcraft (2004) continued to popularize virtual worlds into mainstream entertainment vernacular and culture. The video game industry also began offering virtual world and role-playing games both for dedicated video game hardware, as well as for online play.

This is, by far, just a look in the past. With augmented reality, mixed reality, improved mobile technologies (Brown, this volume), and other emerging technologies, virtual worlds will continue to morph in years to come.

The Virtual Worlds "Hype" Cycle

As the Gartner Hype Cycle for Social Virtual Worlds shows (Figure 14-1), interest in virtual worlds has fluctuated since their debut in 1987. Over the last several years, however, there has been a marked increase in awareness and attention in the virtual worlds industry, summarily followed by a leveling off of priority focus and investment. A leading technology consulting and research group contends that "public virtual worlds are [now] suffering from disillusionment after their peak of hype in 2007" (Gartner Inc., 2008a) and growth in the industry will continue to level off until optimal ways to use the technology become apparent. Perhaps an increase of successful implementations will spark the new surge in interest and investment (Gartner Inc., 2008a) to sustain the market until there is a new breakthrough.

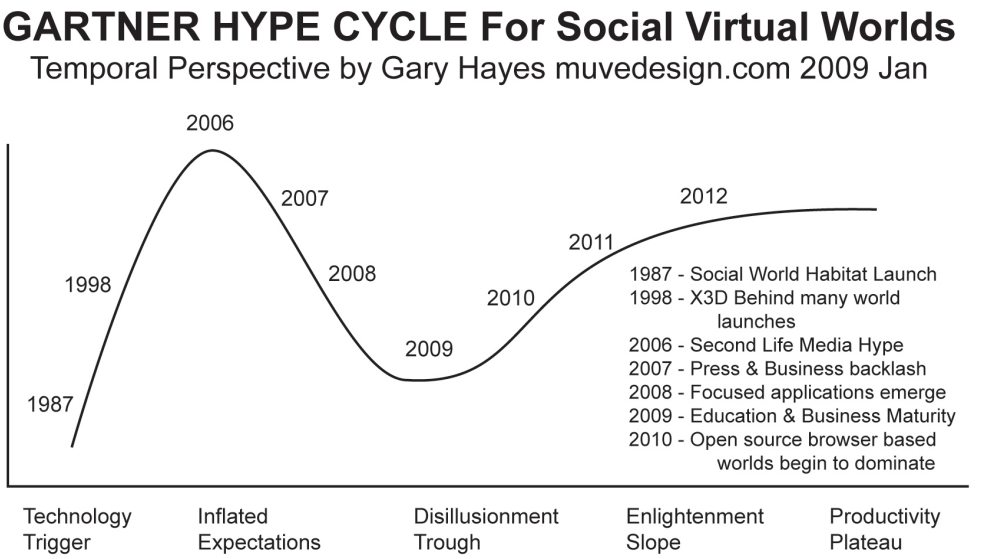

Figure 14-1. Gartner Hype Cycle for Social Virtual Worlds. The hype cycle depicts the cycle of fluctuations of interest and investment in the technology of virtual worlds. http://www.muvedesign.com/the-virtual-worlds-hype-cycle-for-2009/

Although Gartner's Hype Cycle shows a steep decline from 2006-2009, those in the education and training industry recognize that this is not a true decline. It is not a matter of interest waning or the hype being dispelled. The matter is simply this: now that there is significant improvement in the technology and in its available features, what can the industry really accomplish with virtual worlds? Many pilot tests, projects, and programs are underway to explore just that.

While this application of virtual worlds is not new, the wider adoption of virtual world environments for training and learning raises the risk of repeating the mistakes made when the industry was trying to figure out how to adapt content from the classroom to the e-learning environment. This is the challenge: industry is faced with determining how to both design and develop new content, or adapt classroom and/or e-learning content, for use in virtual worlds.

Implementation Success

A Gartner Inc. press release indicating that 9 out of 10 virtual worlds programs fail within 18 months of launch (2008b) highlights the need for the industry to identify concrete requirements and discover useful applications that will lead to an increase in successful implementations and, ultimately, more quickly to the next evolutional node along the immersive learning continuum. Failing to do so may result in a continuous series of failed pilots, sustained waning of the adoption cycle, and persistent risks of serious disappointment—possibly to the point of participants in virtual world projects eschewing the technology altogether.

The Virtual Worlds Investment Cycle

A significant drop in investments in virtual worlds from 2007 to 2008, underscores the need for continued research; according to Gartner Inc. (2007), more than $1 billion was invested in virtual worlds in 2007 whereas that amount fell to $885 million in 2008 (Jackson, 2007). While there are likely many factors contributing to this decline in investment, including a serious global recession, it is important to note that even though 9 out of 10 business experiments with virtual worlds fail within 18 months, there are estimates that by 2012, 70 percent of organizations will have established their own private virtual worlds (Gartner Inc., 2007). With continued interest, and despite mounting failures, there have been some successes. It is clear that many see the potential that virtual worlds offer. Now, it is up to the training, education, and entertainment industries to determine the best ways to methodically and effectively exploit the unique capabilities and affordances of virtual worlds in order to fully integrate this technology into our instructional and gaming design toolkits and culture.

One solution to the problem of what to do with virtual worlds is evident in the education and training industry, specifically. Crafting meaningful learning experiences has, historically, been a great challenge in situations where context is as important as content. Role playing scenarios, case studies, and discussions are a few of the instructional strategies used to provide a rich, experiential aspect to traditional classroom and e-learning courses. These same strategies can still be used in a virtual world; however, the approaches now have the added benefit of a group dynamic in a persistent, graphically rich space that is real, rather than imagined; that is co-created rather than dictated; that is simultaneously shared by many for the purpose of collaboration, rather than accessible to a few. Indeed, virtual worlds have also given way to new instructional strategies not possible in traditional learning environments.

There are, undoubtedly, fringe experiments being conducted with the specific goal of shifting learning paradigms with this tool. While contributing to the overall failure rates of virtual reality implementations, these "way out" and often failure prone projects are a necessary part of the process of discovering new ways to use virtual worlds.

Thus, instead of jumping on the virtual world bandwagon "for the cool factor" or "because competitors are doing it," a clear understanding of the features that most virtual worlds share helps decision-makers identify the unique attributes that may address specific training, education, or performance improvement needs, which will also inform purchase decisions. There are six features most virtual worlds have in common (Federation of American Scientists, 2009; Virtual World Review, 2009). A brief examination of the benefits of these affordances, as shown in Table 14-1, for the individual and the community in which individuals operate, illustrates virtual worlds' value as a teaching and learning medium.

Table 14-1

Virtual World Affordances and Their Benefits for Individuals and Groups

Affordances of virtual worlds	Individual-focused benefit	Group-focused benefit
Co-creation	Fosters peer-to-peer support and tutoring	Fosters multi-user content development or modification
Co-existence	Enlivens communication and interaction; blurs the line of distance	Enables multi-user simultaneous interaction in a shared environment
Collaboration	Enables users to self-select groups based upon goals or needs	Encourages users to develop peer, affinity, skill, interest, and/or groups
Graphical User Interface	Offers visual context of environment and other inhabitants	Offers visual context of environment and other inhabitants
Persistence	Maintains 24/7 existence; provides convenient access	Enables progress and change to take place regardless of individual log-in status; helps close the distance/time gap
Presence	Defies distance; provides situated context	Minimizes feelings of 'disconnectedness'

In addition to the basic affordances of virtual worlds, most applications either boast other attributes aimed at a specific audience or offer enhanced capabilities for one or more of these six common features. Determining the most appropriate tool for one's needs requires knowing what, if any, additional features are needed beyond the six basic common features that may help in reaching the intended instructional goals of the virtual worlds initiative (Sitzmann & Ely, this volume). This step, along with an analysis of organizational and technical considerations, helps to narrow the list of potential applications that address the concrete requirements identified during the requirements analysis phase of an education, training, or performance improvement project.

There is little definitive guidance in performing requirements analysis for virtual worlds, and there is a need for further research in this area. However, an examination of fundamentals of instructional design may provide a framework to guide the requirements analysis phase.

Designing for Learning in Virtual Worlds

The remainder of this chapter is based upon the premise that designing for learning in virtual worlds should be grounded in three basic tenets of sound instructional design. These stipulate that instruction and knowledge construction have a better chance at being successful if 1) they are based upon a learning environment and content resulting from requirements-driven design, 2) have clear objectives, and 3) target the appropriate audience. Sound instructional design methodologies will help instructional designers create successful learning experiences for this modality, which can ultimately be linked into systems that also support SCORM (Panar, Rehak, & Thropp, this volume).

In order to move toward a better understanding of designing learning experiences for virtual worlds, it is necessary to examine the fundamentals of instructional design. Such an examination will, at a minimum, help designers avoid making mistakes that could jeopardize their virtual learning curricula and programs. Part of the Advanced Distributed Learning Initiative's mission is to develop best practices that reduce risk and increase the opportunities for success. The analysis phase is an important first step in ensuring sound design for virtual worlds instead of a "buy it, build it, they will come" ideology.

Virtual World Design and Learning Frameworks

The tenets of a traditional instructional design model apply to designing learning opportunities for virtual worlds—with some modifications. Certainly, there is a need to conduct all five phases of the Analysis, Design, Development, Implementation, Evaluation (ADDIE), or similar, instructional design process model (Deibler & Berking, this volume). For the purposes of this chapter, the ADDIE model will serve as a foundational model for the virtual worlds learning framework. While it is often referred to as a "production process," ADDIE offers much more to the instructional designer than production—which is the end result. ADDIE is a substantial framework (known by a variety of names) that has been proven in many industries (architecture, software, engineering, training design, etc.). One approach for designing learning experiences for virtual worlds is not only to follow, but to augment ADDIE, and to leverage lessons learned and best practices obtained through research and experience. The analysis phase of the ADDIE model may be applied to determine needs and uses of virtual worlds as a potential teaching and learning tool.

As a potential teaching and learning tool, the power that virtual world platforms offer is especially important "when learners need to gain high-level skills (e.g., in Bloom's taxonomy: application, analysis, synthesis, and evaluation) in order to perform critical job functions (e.g., develop sales strategies to meet clients' unique requirements)…." (Whiteside, 2002, p.9). By their very nature, virtual worlds provide an immersive learning experience that learners identify with as being realistic, authentic, meaningful, challenging, and motivating (Affiliated Computer Services,

2009; Calongne, 2008; Dede, 2007; Gamor, 2001; Gao, Noh, & Koehler, 2008). As shown in Table 14-2, the concept of immersion in virtual worlds is achieved through the six common characteristics which have different in-world representations.

Table 14-2

Affordances of Virtual Worlds and Their Representation In-world

Affordances of virtual worlds	**Representation of affordances in virtual worlds**
Co-creation	Materializes through building concepts, objects, and other creations together
Co-existence	Emerges through occupying space with other participants at the same time
Collaboration	Exists through sharing ideas, thoughts, and work products synchronously and asynchronously, constructing a potentially endless feedback/interaction loop
Graphical User Interface (GUI)	Appears through a representation that illustrates the key elements of the authentic context(s) necessary to create a feeling of "thereness"
Persistence	Manifests through preservation of ideas, thoughts, work products, and other objects
Presence	Appears as the capability to engage in real-time interaction with others who are in world

Understanding these characteristics helps the instructional designer to identify relevant learning theories and models that could apply to teaching and learning in virtual worlds.

While the education and training industry has not yet agreed on an approach for designing learning for virtual worlds, standardizing a learning framework should not be quite as difficult a task, since virtual worlds as multimedia learning tools, embody the elements of constructivist learning environments. Constructivist learning environments enable "[l]earners [to] build personal interpretation of the world based on experiences and interactions" (Dabbagh, 2008; Dede, Clark, Ketelhut, Nelson, & Bowman, 2005; Nelson, Ketelhut, Clarke, Bowman, & Dede, 2005; Delwiche, 2003; Walker, 2009). Experiences and interactions are embedded within authentic contexts which provide learners the opportunity to construct knowledge from multiple perspectives and situations (Dabbagh, 2008; Jonassen, Grabinger, Harris, 1991; Rheingold, 1991). David Jonassen and colleagues (1994), leaders in constructivist theory and methods,

point out that there social and cognitive constructivism has significant implications for instructional design that can be applied to virtual worlds as constructivist learning environments. Table 14-3 sheds light on VW affordances through mapping principles of constructivism for instructional design against affordances of virtual worlds.

Table 14-3

Principles of Constructivism for Instructional Design Mapped Against Virtual World Affordances

Principles of constructivism for instructional design (Jonassen, Campbell, & Davidson, 1994)	**Affordances of virtual worlds**
Offer multiple representations of reality	GUI Collaboration Presence
Represent the inherent complexity of the real world	Persistence Coexistence
Emphasize knowledge construction, rather than reproduction	Co-creation
Present authentic tasks (instruction in context rather than out of context)	Coexistence GUI
Provide real-world, case-based or problem-based learning opportunities, rather than pre-determined, prescriptive instructional sequences	Persistence
Encourage reflection on experience	Collaboration Persistence
Enable context-and content-dependent knowledge construction	Presence GUI
Support "collaborative construction of knowledge through social negotiation, not competition among learners for recognition"	Collaboration Presence

There is much research to build upon here, but the space limitations of this chapter allow only brief mention of a few key components.

In addition to constructivist theory, Kolb's experiential learning model provides a useful way of understanding the nature of learning that is context- and experience-based. According to Kolb (1984a), "learning is the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping experience and transforming it." In other words, experience offers a way of knowing that is personal. Personal experience is memorable and meaningful in a way that is unique to the individual. Once an individual has an experience and constructs

meaning from it, the knowledge gained is accessible for reflection, sharing or transfer to other situations, contexts, or experiences (Kolb, 1984b; Jonassen, Davidson, Collins, Campbell, & Haag, 1995).

Constructivist epistemology and experiential learning theory are just two of many constructs that can contribute to building a framework for optimizing the unique features that virtual worlds add to the instructional designer's toolkit.

Regardless of one's concept of *how* the tool may be used (e.g., as a course activity hub, course's sole delivery mode, or a course's preplanned, discrete event tool), there are characteristics inherent in the nature of virtual worlds themselves that shape the learning experience. That is, virtual worlds are by nature **constructivist** (knowledge and meaning are generated from experience), **experiential** (effective learning occurs when people directly create meaning by interacting with the learning environment, its contents, and its inhabitants), **constructionist** (effective learning happens when learners actively make things), and **compelling/motivating/ challenging** (for example, games—both serious and entertainment types, role plays, and immersive problem identification or solving activities). There is much research and experience in these areas, eliminating the need to take shots in the dark at or to start from scratch in the development of new instructional approaches.

Constructivist and/or experiential instructional principles, theories, and models are a logical place to start when determining how virtual worlds can facilitate a solution to an instructional or performance improvement challenge. In addition to considering these requisite principles, theories, and models during the analysis phase, instructional designers must also leverage the unique benefits of the 3D experience in order to exploit the best of virtual worlds to address a specific requirement, or set of requirements.

Focus on Analysis

The purpose of the analysis phase in the ADDIE process model is to consider requirements or other issues that may provide direction on what, if any, instructional solution is necessary. Assuming an instructional solution is necessary, and once a virtual world tool is identified as part of a solution, then it comes down to deciding on which tool to use. (Certainly, due diligence is required in order to arrive at the previously mentioned assumed solutions.)

To get started, however, designers may benefit from asking these questions from the partial checklist shown in Figure 14-2 to reassess their preliminary conclusions.

Analysis Checklist

- √ What learning goals does my current learning design fail to address? Or, where might the unique affordances of virtual worlds enhance my existing curriculum?
- √ What specific instructional strategies are optimal at addressing the failed learning goals?
- √ Using my current toolset, how can I design an intervention to implement the required instructional strategies?
- √ Is there a gap between my current toolset and the instructional strategies I need to implement? If no, then use the appropriate tool from the current toolset. If yes, then consider new tools, such as virtual worlds.
- √ With what existing instructional interventions must new tools or platforms interface?

Figure 14-2. ADDIE Analysis Phase Checklist. A thorough analysis checklist may assist in procurement decisions.

Deepening the Analysis

Since ADDIE is not intended be a detailed, step-by-step process model, the requirements analysis must also recognize the other considerations to take into account. Completing an IT infrastructure analysis, audience analysis, and a job/task/learning experience analysis are a few of the considerations that must be made. Each of these analyses will help to further identify and refine needs that will influence learning intervention solution and procurement decisions. Augmenting the ADDIE process model with Khan's e-learning framework may help identify most of the critical questions that should be addressed since ADDIE, in general, is neither detailed nor prescriptive.

Khan's e-learning framework is applicable to virtual worlds and augments the ADDIE process model by providing more detailed phases and specific steps than the ADDIE model. The eight dimensions of Khan's framework (Khan, 2005) represent areas requiring consideration early in the e-learning development process and revisited throughout the project's lifecycle as part of a continuous improvement strategy. These dimensions are critical to establishing a successful virtual world learning experience—whether it be an event or entire curriculum of events: institutional, pedagogical, technological, interface design, evaluation, management, resources support, and ethics. Each of the areas delineated in the framework must be examined before selecting a virtual world application (Voorhees & Dawley, 2008). The analysis phase must identify all limitations and restrictions in order to avoid acquiring a tool that cannot be used.

The ADDIE process model frames the method for identifying the performance problem; ensuring that the problem is, in fact, education or training related, and illuminating the various aspects of an organization that need to be factored into the

overall learning strategy. Khan's framework, on the other hand, augments ADDIE by providing specific guidance on ADDIE vis-à-vis his eight dimensions. These eight dimensions help avoid missing any critical success factors when designing a learning project. Solution sets resulting from these analyses can be assessed only after the identified weaknesses in the training program are thoroughly identified.

Neglecting the analysis phase poses the same risks inherent in any solutions-based project, regardless of the anticipated outcome or desired solution. Requirements must drive solutions definition and tool adoption, and not the other way around. Virtual worlds, like any other tool, should be analyzed as an "enabler" for the specific solution, not as an end unto itself. In addition, affordances and potential uses of virtual worlds and other tools should be factored into the examination of prospective solution sets in order to select the solution with the highest probability of success.

Potential Uses

Starting with what we already know about course development and sequencing content may help instructional designers use virtual worlds to augment existing curricula and discover unique, meaningful uses of virtual worlds. The Virtual World Implementation Continuum shown in Figure 14-3 illustrates how virtual worlds can be used to support various components of a learning curriculum.

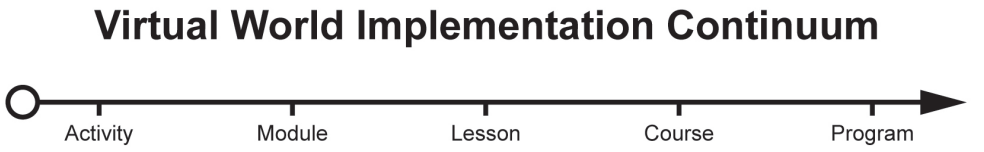

Figure 14-3. Virtual World Implementation Continuum. This figure illustrates the range of uses of virtual worlds in a learning program.

The Virtual World Implementation Continuum illustrates that there are multiple possibilities for how virtual worlds may be used in a learning environment. Whether applied in traditional, face-to-face classroom or e-learning settings, the unique affordances of virtual worlds can enrich almost any learning experience. Using virtual worlds in a learning context does not have to be an "all or nothing" proposition. Indeed, there is a risk of losing some of the inherent benefits of virtual worlds (persistence and community-building through co-existence and collaboration) when applied in an ad hoc manner; however, when the decision to use this implementation approach is confirmed, it should have little impact on the overall experience since the requirement did not underscore these specific affordances (persistence and long-term community-

building) as critical for goals set forth in the needs analysis. A closer examination and understanding of each implementation option will help to refine the requirements even further.

Activity

Through the use of Immersive Activity Objects (also thought of as Discrete Learning Events), virtual worlds provide a platform for experiential activities that illustrate, for example, a concept that can be applied in a real-world scenario *in-world* or in context. This use of virtual worlds is supplemental and would be suitable for augmenting instructor-led or e-learning courses. Using virtual worlds in this manner adds another dimension to a blended-learning solution that gives learners the opportunity to conduct several higher-order thinking skills at once by using practice, replay, multiple perspectives, role playing, metacognitive analysis, review/dialog, and feedback. This use of virtual worlds could be compared to a simulation with the added dimensions of co-existence and persistence. A virtual world environment enables many participants serving in different roles as many times as they would like. The world remains as the group leaves it, facilitating review, analysis, and reflection. Imagine recording sessions and using them with different classes, offering participants the opportunity to consider multiple perspectives other than those presented in their immediate learning event. Imagine the benefit of having the opportunity to discover and/or solve another problem that resulted from the decisions made in the previously experienced event. In this sense, learning is not disjointed, but fluid—just like real life.

Module

Some content may benefit from having an entire immersive module. In these cases, the content is such that reading about it and discussing it alone doesn't provide a meaningful, memorable, personal understanding of it. For instance, experiencing a module on *Interacting with the Press* would have much more meaning than just reading one. What does it mean to: "Be careful about your choice of words when speaking to members of the press" or "Can seemingly innocent comments put people or a country at risk?" These concepts are not easy to express in words only. Crafting a realistic scenario wherein students can participate in and examine an interview from multiple perspectives would enable them to understand the complexities of both monitoring one's own words and behavior, and also being aware of the words and behavior of those surrounding them. Such a design requirement would also necessitate an opportunity for practice. Role-playing, in addition to observation, would be a useful exercise. Participants could be divided into teams to design a scenario. Afterwards, they could present their scenario, asking the observers to predict behaviors and outcomes as they go along. Learning facilitators could contribute by sharing real interviews from the Internet and discussing the salient issues. There are many options when there is an instructional need to provide first-hand experience in order to understand and construct personal knowledge about a given topic.

Lesson

Facilitating a lesson in a virtual world could be valuable if, for example, the main goal of the lesson is based on situated cognition. For instance, in a course on harassment (while students could read about the harassment laws, scenarios, and anecdotes) constructing a personal understanding would best come from experience. Build consequences into the scenario and the student motivation will likely peak as focus grows more intent. Sound like a game? This is no game, for in real-life, consequences result from our actions. It's better to learn how to analyze a scenario, identify a problem, and solve the problem in an environment where the cost of failure is lower than to experience them in real life where the cost is generally exponentially higher and more difficult to correct. In the case of experiencing the world of harassment within a virtual environment, on the other hand, failure simply provides more learning opportunities and increased knowledge transfer to the real world (Kolb, 1984, 1984b).

Course

A course or an extended learning experience is defined as a set of immersive events centered on an overall course goal and a specific set of learning objectives. Under what circumstances would it be useful to facilitate an entire course or extended learning experience in a virtual world? Virtual worlds would significantly benefit a course or learning experience whose objectives are bound to higher order thinking skills that require analysis, synthesis, and evaluation opportunities. A good example is viewing a "course" as an evolving group of learning experiences designed to help learners gain first-hand experience in analyzing defect detection; predicting outcomes of accurate and inaccurate detection skills; and testing alternate actions. Further, incorporating a knowledge support network in an extended learning experience by inviting subject matter experts, former learners, or participants representing multiple perspectives may build a community that could continue well after the formal "course" construct has come to an end rather than simply as a discrete set of learning experiences.

The group dynamic should not be underestimated (Johnson & Johnson, 1996), especially in virtual worlds, for it is a prime environment for many learners to come together simultaneously in a graphically rich, interactive context. In this case, learners continue to have access to an environment that could serve as an environment wherein they can refresh skills, volunteer as a mentor, and share real-life experiences. In addition, such a learning experience can provide instructors and learners more context and performance-specific feedback during the experience, rather than simply the didactic responses typically seen at the end of online instruction events. Since the feedback occurs during the learning process, rather than after, learners can analyze the feedback and make necessary modifications as they go through the experience. These are powerful benefits of immersive learning in virtual worlds.

Offering a course entirely in a virtual world brings with it many opportunities to challenge the way we teach and learn in order to work smarter. Given the technologies designed to improve productivity, access, and communication, it is time that the affordances of these technologies drive the way they are applied.

Program

An entire learning program is normally comprised of a variety of media and resources applied within a set of learning experiences designed to address multiple, related subjects. The main thrust of a program can benefit from having a virtual world as its central platform if higher order thinking skills, context, and/or access to experts are critical. Consider a "town hall, student union, cohort, or conference hall" metaphor. The virtual world could serve as a meeting place, learning platform, or a place organized around themes, which facilitators and participants generate, develop, and maintain. David Jonassen and colleagues (1995), leaders in constructivist learning theory and methods maintain that "constructivist environments engage learners in knowledge construction through collaborative activities that embed learning in meaningful context and through reflection on what has been learned through conversation with other learners" (p. 13). With this model, the interactions may be directly and indirectly evaluated within the community to understand a learner's individual performance. Instead, perhaps these interactions will be evident from the performance observed during the specific learning events or experiences comprising the overall course or program.

Conclusion

Virtual worlds promise to usher in new ways of teaching and learning. Building upon what we already know about teaching and learning in online environments is an important first-step when designing future studies to explore virtual worlds as learning environments. As societal expectations about learning and learning experiences continue to develop, meaningful, carefully designed applications of virtual worlds in formal training settings can help pave the way for the new ways of teaching, learning, communicating, interacting, and socializing. To get there, a good start is to begin with elements that are tried and true. What we know for sure is that if requirements are clearly defined and options are clearly understood, the chosen solution, at a minimum, stands a greater chance for success at its intended purpose. A thorough requirements analysis as a prerequisite may even yield results beyond our expectation, and that's a good thing

As is the case with other emerging technologies, such as social media (Fowler, this volume), intelligent tutoring systems (Hu, Graesser, & Fowler, this volume), mobile devices (Brown, this volume), and games (Xu, this volume), ADL must maintain an awareness of the power of these technologies, and of course virtual worlds, to enhance learning outcomes or increasing training efficiencies. This awareness must feed into future specifications, standards, models, services and architectures to achieve the ADL vision of the highest quality training and education delivered on demand. This is the future of e-learning.

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The Author

Keysha Gamor, PhD, is an Instructional Systems Designer (ISD) and Research Scientist at the Advanced Distributed Learning Initiative (ADL) for the Office of the Secretary of Defense. In this role, Dr. Gamor is responsible for developing ISD guidelines for emerging technologies, such as Web 2.0, 3DI, virtual worlds, and virtual reality.