

TECHNOLOGY CORNER:

GAMES FOR GOOD— HOW DAU IS USING GAMES TO ENHANCE LEARNING

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The use of games has become a popular initiative in many learning organizations. The Defense Acquisition University, by targeting enhanced outcomes for learners and using innovative, multiple approaches to develop games and simulations that are engineered to yield performance-oriented outcomes, has created a unique opportunity to reach an evolving workforce on multiple levels. Through the use of story and interaction, students gain a better understanding of the dynamic application of course content, while fostering motivation to learn and increasing perceived relevance of the instruction. This article covers the use of games and simulations in three different initiatives: Games in Curriculum, Games in Continuous Learning Modules, and Mini-Games—each of which was created with the end result of learning in mind.

Games and Simulations at DAU



Background

As the Defense Acquisition University (DAU) prepares for a younger workforce and the increased performance capabilities that will be expected of that workforce, it has simultaneously transitioned its curricula from a more traditional, educationally focused organization to a true training organization. Within DAU, the necessity for preparing students to perform at higher levels has generated an increased emphasis on providing students not just with the information they need to do their jobs, but also the skills necessary to accomplish the unique challenges they will face upon arrival in their workplaces.

This combination of unique needs has caused DAU to innovate and transform a more traditional educational program into one that accepts the increased use of online learning and reductions in classroom “seat time,” presenting an opportunity to rebuild the university’s classroom lecture environment into one that more closely aligns with a hands-on apprenticeship. This rebuilding is made possible through the caliber of education that DAU provides, particularly in its incorporation of a games and simulations-based initiative, which allows students to experience workplace events that they will face during their classroom and online learning.

While simulations have traditionally been used to provide people with experiences that they might otherwise not have because they are either too expensive, too dangerous, or happen too infrequently, simulations are more frequently being used to address performance-oriented learning objectives in educational and training environments. Most simulations, however, are linear and are only used once. To increase the benefits of using simulations, DAU incorporated gaming characteristics into its curricula because of their proven capacity to increase a student’s motivation to interact with the course content in meaningful and targeted ways. This is accomplished through the inclusion of high-level storylines to serve as a unifying scenario for courses, and game themes in order to support the use of increased interactivity. Specifically, using storylines makes it possible to present content that is more relevant to learners. And relevance is a key component to increasing the “perceived value” of the learning experience to the learner. When motivated learners are presented with information in the appropriate context, gaming also facilitates the ability of learners to integrate that information into the mental models where individuals retain and recall their workplace experiences. Therefore, providing the context of the information being presented can increase a student’s ability to understand why and when that information can and should be used. This is also theorized to lead to increased ability for a student to transfer that learning experience into their everyday workplace experiences.

In short, the use of game characteristics can enhance the learners’ ability to make meaningful connections, retain and transfer knowledge, and motivate them to interact with course content by providing experiences when combined

with simulations. When combined, games and simulations have the ability to provide the learner with experiential learning opportunities that focus on:

- **Appropriate Context**—The ability to allow learners to use the content in scenarios or situations that are representative of how the content would be used in the real world.
- **Cognitive Fidelity**—The alignment of the content with processes that are representative of how the information would be used.
- **Varied Situations and Replay Opportunities**—The ability to provide multiple practice opportunities for content use based on scenarios and situations that are different in key ways in order to expose the students to a variety of experiences with the content; and the ability for a learner to use these tools multiple times in order to try new strategies for how the content could be used.
- **Self-Diagnosis**—The ability for learners to gain an understanding of their strengths and weaknesses in order to provide them with the information they need to self-monitor their learning process.
- **Scaffolding**—The ability for information to become increasingly complex as a learner evolves, with previous information being built upon in order to provide a gradual increase in their understanding.

Through these game characteristics, it is possible to provide students with the necessary motivation and relevance (Figure 1) to internalize course content

FIGURE 1. RELATIONSHIPS BETWEEN GAME CHARACTERISTICS AND USER MOTIVATION



and transfer the knowledge gained—complemented by their own personal abilities—to performance-oriented outcomes.

Following much time spent considering where and when games could make a difference, implementation of three separate types of games emerged to address the specific needs of DAU's diverse student population and curricula. These three categories vary in level of specificity of games and are detailed here.

GAMES IN CURRICULUM

The first and most specific category, Games in Curriculum, focuses on games that are aligned highly enough with a course's learning objectives and context to warrant a game being placed in a course. Since acquisition is a very specific process, often these types of games are naturally going to be custom developments. In these types of games, it is important to consider the aspects of the algorithm that predict the meaningful use of a game in order to establish the highest probability of enhancing performance. One example of this type of game lies in the use of a series of games within the Business, Cost Estimating, and Financial Management curriculum. Specifically, a low-level course that serves as a required course for all students in the career field was selected to include a series of related games. While the course selected represented a high-performing course, a content analysis of the course indicated that this course transmitted primarily conceptual knowledge, often including a heavy emphasis on vocabulary memorization while providing case information of little use or context. It was hypothesized that by including games at the end of each of the online courses—eight modules that provided situations in which the information being memorized could be used—students would find more relevance in the information being presented, and therefore would be motivated to retain the information.

The game, named Rat Race (Figure 2), centers around a story of a rat who, after having lived in the Pentagon for many years, has mastered the art of business financial management by listening, befriending, and assisting some of the world's greatest minds in the acquisition process. Under this frame, players are able to practice the lessons learned within the context of their real-world application, but using a fantastical character that is both endearing and engaging.

GAMES IN CONTINUOUS LEARNING MODULES

Continuous Learning Modules (CLM) at DAU are very specific 2- to 4-hour online learning modules that supplement the core curriculum. They often target specific career-centered information related to process-oriented performance characteristics. In the case of one CLM in particular—Procurement Fraud Indicators (PFI)—the content of the module deals with the ability to identify fraud when it takes place in the workplace. Like many judgment-sensitive areas, the nature of this content is shaded in gray area, innuendo, and non-yielding protocol. The continuum gap between novices and experts in these sorts of content areas is

FIGURE 2. REPRESENTATION OF THE BUSINESS, COST, AND FINANCE GAME



often filled with personal experiences and first-hand accounts. In the absence of those, the use of an experiential game can serve to provide students with the varied situations and opportunities to practice in a safe environment.

The PFI capstone game is, at heart, an adventure game, not unlike traditional point-and-click adventure games designed for the personal computer. The game is divided into several different scenarios, each focusing on a specific character that is suspected of committing fraud. Each scenario is divided into two phases.

Phase 1. The “Hidden Object Phase”—an exploration mode where the player visits two scenes to collect clues and piece together information about the fraud being investigated. The scenes differ between each scenario, and range from the mundane (a home office) to the exotic (a Navy vessel).

Phase 2. The “Interview Phase”—the point in the game when the player moves to the interrogation room, where the suspect is questioned about the situation to gather more information. In the Interview Phase, three theories are presented, each using the same clues to draw different conclusions. The player can investigate any or all of the theories, drawing his or her own conclusions from the information presented.

At the end of each line of questioning, the user can attempt to identify the fraud that occurred and the indicators that suggest it (encapsulated by the

on a student's ability to understand when and why the tools are appropriate for use, using a fantasy-based alien production line (Figure 3). The story that surrounds this game introduces an alien army heading towards earth. The student does have a weapon that can defeat them, but only a limited amount of time to finish production of enough weapons to defeat the aliens. At the current production rate, there will not be enough weapons to save earth. Using proper CPI methods, players have to improve the process currently in place to increase production and save mankind.

Conclusions

Through insertion of the three types of games and simulations discussed in this article into its course content, DAU will have an opportunity to measure the success of games and simulations and their utility in learning. The insertion of Games in Curriculum, Games in Continuous Learning Modules, and Mini-Games into DAU course content, as well as several other projects currently in development, will pave the way for the university's ultimate transition to a more hands-on, apprenticeship-type learning environment, increased motivation, and increased relevance for students through interactivity and experiential learning tools. Together, these will help engender a culture of performance-oriented learning, culminating in an across-the-board higher level of on-the-job performance excellence.

Author Biography



Dr. Alicia Sanchez specializes in the implementation of games and simulations into a variety of learning environments. Leveraging decades of research in Education and Simulations, Sanchez' focus lies in using games within curricula and emerging technologies, continuously redefining the potential of games-based learning options. Since completing her degree in Modeling and Simulation, she has served as a research scientist at Old Dominion University prior to being named DAU's Games Czar.

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