# Instructional Designers Take All the Fun Out of Games: Rethinking Elements of Engagement for Designing Instructional Games

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**Abstract**: Instructional designers frequently attempt to mimic the design of popular and commercially successful video games in the design of educational games. These educational games have had little success compared with their commercial counterparts, partly due to designers' resistance to altering their way of thinking about traditional instructional design (for example, the strong desire to state learning objectives explicitly). We argue a theoretical stance that instructional simulations can use engaging elements like those in popular video games by following attention-focusing principles used within the structure of the simulation context. We offer recommendations on ways of sustaining engagement within instructional simulations and discuss ongoing research efforts in this arena.

## Purpose

Too often "video games" and "instructional simulations" are mentioned in the same breath, as if they naturally should be grouped together when speaking of the design and use of interactive media designed to teach. However, there are important distinctions about what goes into the design of a successful video game and an effective instructional simulation. In this paper we define the engaging components of popular video games and discuss their potential for inclusion within the elements of effective instructional simulations. While video games and instructional simulations are different in design, we contend there are areas of potential crossover by discussing a way of embedding engaging elements into instructional simulations that may help reduce the described disconnections. At the conclusion, we describe areas of research that should help illuminate the issues surrounding the instructional design of simulations using embedded elements of engagement within the dramatic scenario.

## Theoretical Perspective: Conditions of Engagement for Instruction

Traditionally, commercially successful video games have held high levels of user engagement. Studies of engagement and motivation have identified overlapping elements that contribute to how people retain high levels of motivation when playing games (Malone 1980; Malone & Lepper, 1987; Lepper & Chabay, 1985). One study went as far as describing three conditions that directly attributed the focus of peoples' attention to computer-based games: curiosity, challenge, and fantasy (Hedden, 1998). Recently, designers have used these ideas for learner engagement in their development of immersive virtual learning environments (Winn et al., 2002). We propose a modified version of Hedden's conditions that better represents traditional efforts in creating learning environments, and provide explanation of these elements that focus attention and combine to form "engagement:"

- *challenge* – the gamer is provided a goal, and activities (neither too complex nor too simple) are required to make progress within a situation or environment
- *proclivity* – an environment that holds a personal interest, drawing an individual toward the subject matter in a way that sustains interest

- *uncertainty* – imagining a number of possible outcomes to an activity, and the desire to want to reach an attainable stopping point which requires a measure of persistence

Off-the-shelf instructional software has tried to capitalize on the formula for motivating gamers using challenge, proclivity, and uncertainty with the goal of engaging the learner in educational activity.

For the most part, the attempt to engage learners in the same way commercially successful video games have has met with disappointing results. The disappointing results are due in part to how instructional designers have used rigid methods when implementing models within the educational product environment. It is not that the instructional models are rigid themselves--using First Principles (Merrill, 2002) and ADDIE as examples--but rather the way designers have implemented disengaging activity within the design. For example, when explicitly stating instructional objectives, the design may take the gamer out of the realm of "proclivity" by discontinuing thoughtful flow within the environment. The way the environment helps maintain the gamer's interest, drawing the gamer into the subject matter realm, is key to intrinsic motivation. This is not to say that reflective, meta-cognitive activity is not a useful method to direct the learner's attention. But rather, a different way of illuminating the learning objectives might be advisable to sustain learner engagement.

Another example is when designers disengage the learner through conventional assessment activities. Much of educational software, including many of our own online courses, attempt to account for "learning" by offering a series of questions at the end of each lesson that reviews material that the learner encountered moments previously. This method is not only questionable in its effectiveness, it also tends to disengage the learner by taking their attention away from the gaming environment. What would happen to the popularity of Everquest if after each battle, the gamer had to answer a series of point-and-click questions about their methods of attack and their plans for future adventures? Breaking the "challenge" of the game, or stopping the progress one has made, diverts their attention and disengages the player.

What holds promise for instructional simulations is the use of the dramatic scenario within the contexts of the learning activity. As outlined by Gibbons and Fairweather (1998), effective instructional simulations consist of a unifying dramatic concept (or series of unifying dramatic concepts) that exemplifies the designer's instructional goals based on a particular problem. The dramatic scenario should contextualize the learning issue, offering the learners an opportunity to match the contrived situation with one in which they are conceptually familiar. The scenario, in this way, offers a comfortable starting point for which the learners may identify themselves and create the necessary associations. In choosing an appropriate circumstance or context for a dramatic concept, the scenario can mirror the engaging elements common in popular gaming culture. The scenario should meet the requirements of dramatic structure to function in a way familiar to gaming students: a scenario must have elements of challenge, proclivity and uncertainty.

## Data: Extracting the Elements of Dramatic Scenarios for Effective Instructional Simulations

Aldrich's six criteria of an educational simulation (2004a; 2004b), based on the Virtual Leader simulation project, are divided into two categories that describe the delivery elements of the simulation and the type of content within the simulation. His delivery criteria are simulation, game and pedagogy; his content criteria are systems, cyclical and linear. However, based on our experiences we feel that his described delivery elements fail to adequately emphasize the role of intelligent participants within the simulation. Further, his criteria of pedagogy does not provide an emphasis on the issues that surround learning, including the way information is represented and aspects of cognitive load. With Aldrich's content types, we assume they only specify a computer-based environment that also provides simulation-

like features of repeatability, scalability, and cost-effectiveness.  However, we are unsure if this assumption is warranted.

Using the criteria from Aldrich as a starting point for defining the elements of effective instructional simulations, we emphasize the pedagogy and engagement factors within the simulation scenario of our criteria:

- Addresses a learning issue
    o Complex – requiring a level of depth beyond what one sees in simple "walk-through instruction"
    o Intentional – directed instruction aimed at identified problems, but may be exploratory in nature
- Contains learning objectives or goals
    o Explicit or implicit, depending on how they fit within the flow of the scenario
- Includes participants with constraints (rules)
    o Not observers, requires a level of interaction
- Includes an environment with constraints (rules)
    o Contrived for other-world experiences, and/or
    o Mimics real-world processes, sequences, etc.
- Operates by a facilitating mechanism – includes required hardware, software, and non-computer based resources
- Requires activity
    o Interactive (contains feedback, adaptation, choice)
    o Autonomous (embedded information)
- Based on non-random outcomes
    o Sequences of events produce a predictable outcome, ultimately tied to learning goals
    o Events within a scenario may have random qualities
- Repeatable

In addition to the essential criteria listed above, we recommend keeping other design criteria in mind as well in order to take full-advantage of what instructional simulations may offer the gamer.

- Scalable
    o Internal – the simulation may be expanded to include multiple players
    o External – the platform may be developed to include multiple scenarios based on similar instructional objectives
- Contains representations not possible / affordable to experience in the "real world"
- Cost-effective

## The Result: Embedding Engaging Elements from Video Games into Instruction

The idea, then, is to take advantage of effective instructional simulation criteria by embedding factors that lead toward our identified engaging elements.  For example, we can embed instructional objectives within a dramatic scenario. Think about a simulation in which the instructional goals are the diagnosis and procedure of repairing an electric motor. In considering how to embed elements of engagement within a dramatic scenario, the instructional designer may have to consider how the instructional goals will be represented.  Perhaps the designer uses methods of "challenge" to uncover goals during the activity and apply acquired knowledge to help diagnose new problems with the motor.

For example, at the opening of the simulation, a brief video is presented in which a plane or spaceship is shot down. A commander character might hurry to the player and direct him to repair the

motor so the team may get off the ground again, reminding him that opponents will be attempting to board the craft soon. The simulation would then continue. This is an example of the "back story" technique, popular in many video games, and is one way of creating engagement within a simulation.

To keep learners engaged and still measure learning, we can embed assessment activities within the simulation's dramatic concept. The design of the scenario should attempt to keep a learner engaged through learning assessment activities. Using simulation scenarios, the assessment does not have to be relegated to a series of questions at the end of each lesson. Assessment might be achieved by meshing elements of "uncertainty" within and during the dramatic scenario. Embedding steps of assessment during a simulation activity offers the learners a means of attaining a reachable resting point and rewards them for their persistence. Dramatic scenarios can be designed to utilize information in new ways, offering the learner an opportunity to transfer their understanding of a given concept or phenomena in different, applied situations.

In the example of simulating the diagnosis and procedure for electric motor repair, the designer may choose to embed "proclivity" within the scenario, offering extrinsic rewards for completing part of the scenario in a given time period or at a specific level of expertise. At a simple level, repairs which take to long could result in the team being captured and the game ending, while satisfactory performance would allow the team to lift off and continue playing. Often, these kinds of rewards come in the form of bonus levels, revealed codes, or even points for obtaining merchandise. Or the designer might consider adding elements of "uncertainty" to the scenario, offering different actions and constraints in which to base a decision when repeating the simulation multiple times. For example, the repairs needed to the motor may differ each time the simulation is played.

In this way, we keep instructional simulations more "game-like" without sacrificing key components within ID theory. The proper design of instructional simulations that utilize key components of engagement within them should result in a more effective transfer of knowledge and skills to the "real world." The simulations should then provide a first hand experience as a means of instruction where it is not necessary for students to interpret descriptions of the world through abstract symbols.

## Educational Impact: Current and Future Research Efforts

Traditionally, when video games and education were mentioned together, little positive was said. Parents generally saw video games as a waste of time when homework or chores could have been done. Players claimed that the games helped refine their eye-hand coordination. Recent attitudes seem to be more accepting of video games; the generation that first played them are now parents themselves. Some proponents have gone so far as to claim that video games constitute a new form of literacy that should be valued in and of itself (Steinkeuler, 2004). In the tradition of Gee (2003) and Terdiman (2004) who have held focus on the literary and social aspects of gaming, we believe that the understanding and application of basic design principles to educational games and simulations can bring huge benefits to a generation of learners who feel more comfortable in interactive digital genres than the one-way broadcast model of the traditional classroom. The authors will highlight various ongoing research efforts both nationally and internationally in their full paper that addresses the building of student engagement within instructional simulations.

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