

# Design Planning for an Alternate Reality Game to Support Learning of Informatics Concepts

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## Abstract

The project assessed approaches to creating an alternate reality game (ARG) for students to learn baseline concepts and skills of informatics in the introductory informatics course at the University of Washington Information School. The objective was to design a framework for a pilot ARG, explicitly outlining opportunities and constraints for the execution of such a game to enhance learning related to existing subjects on the course syllabus. We sought to ensure 1) instructor support for elements of the game, and 2) student participation during the game duration. We gathered information from experienced course teaching assistants and students who had taken the course previously.

**Keywords:** alternate reality games, informatics, education

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## 1 Research Question

Our research question is inspired by personal experience with the difficulty of creating engaging assignments through which informatics students can learn to apply theoretical frameworks in information science, thereby gaining valuable skills for their future professional lives as information systems designers and evaluators (Bachelor of Science in Informatics: Careers, n.d.). Our question is as follows: How could an ARG be deployed as part of an undergraduate informatics course to give students engaging, hands-on learning experiences and lasting professional skills using the concepts covered in the curriculum?

## 2 Alternate Reality Games (ARGs)

An ARG does not take place strictly in the real or virtual world. The “real world” is generally comprised of spaces in the physical world, and the “virtual world” includes sites on the World Wide Web, e-mail, Internet forums, or instant messaging. An ARG incents participants to construct a narrative, which describes an alternate reality spanning the real and virtual worlds. Game players interact with the game designers or “puppetmasters” (McGonigal, 2007) through direct communication with in-game characters (e.g., via email or text). These interactions connect the real and virtual worlds, and entice players to learn about the narrative underlying the individual tasks to move game play forward.

Game players are led into the “alternate reality” by unlocking clues and riddles embedded in online content, such as images and audio files on websites, or mysterious URLs shared in public spaces (McGonigal, 2007). ARG players might not even be certain when they are or are not in the game since the “magic circle” of an ARG does not have clearly marked boundaries – as with a sport court or board game – separating it from the world outside the game (Huizinga, 1955; Jonsson et al., 2006). ARGs, therefore, are sometimes spoken of as “pervasive games” (McGonigal, 2003).

### 3 Games and ARGs in Learning

Existing literature about learning describes a range of game integration, ranging from superficial “gamification” of traditional learning practices to harnessing educational connections in youths’ independent play of commercial video games outside school (Gee, 2003; Tobias and Fletcher, 2011). Video game enthusiasts have also suggested possible ARG applications in the classroom (Penny Arcade, 2012). However, the use of ARGs or other pervasive games to supplement or support learning in formal contexts has not yet been well explored.

There has been increased interest in “flipped classroom” and other uses of new media methods, in which students watch videos or play games to prepare for in-class discussion and work. However, the use of ARGs to blend in-class and out-of-class experiences is still very new. A few studies have indicated that ARGs may be effective ways to support learning. For example, Connolly, Stansfield, and Hainey (2011) examined the use of an ARG to support the learning of foreign languages and Whitton (2009) describes an ARG piloted to help incoming undergraduates at a UK university become oriented to their new city, campus, and library resources. ARGs also have the potential to improve learning by affording students an opportunity to process course content and consider how to apply it (Bransford et al., 2000:58ff).

### 4 Methods and Results

We used three methods of data collection to gather information about the design domains from stakeholders. First, we interviewed the instructor of the informatics course. The instructor reviewed the syllabus, indicating subjects that might be appropriate for an ARG experience, such as Value Sensitive Design (Friedman et al., 2008) or information security. He also described current technology used in the course, such as in-class engagement using a chat room backchannel, and the learning management system for delivering course content.

Next, we conducted a focus group with four undergraduate teaching assistants (TAs) who had worked on the course, using a short participatory design activity to brainstorm ideas for game storylines or topics in the course that would benefit from a gaming application. The TA feedback indicated a preference for a focused game experience, covering only one of the syllabus topics, and they suggested Value Sensitive Design as a possible syllabus topic for the ARG experience. Finally, TAs discussed opinions about incentives for playing the game, coming to a consensus that the game should be a voluntary experience, and offer rewards related to classroom performance (extra credit) as well as indicate mastery within the game (e.g., showing a “leader board” or ranks for contributing players).

Finally, we designed a brief online survey to distribute to former students in the course. We emailed a link to the undergraduate association listserv and received 49 responses, gathering information about existing sites and tools students use to collaborate in and out of the classroom. The students’ responses showed a strong preference for using collaborative tools such as Google documents (for production) and Facebook (for discussion). Students also answered questions about game play, and indicated they undertook a range of roles in collaborative game play, such as leader, organizer, or contributor. We also asked students about their favorite games, and the results revealed a strong preference for both puzzle and role-playing games.

### 5 Theoretical Perspective

Several design issues emerged during our data collection. We found Schon’s (1991) concept of design domains helpful in considering the following topics:

- Structure: Existing socio-technical systems would influence how students interact with TAs, the instructor, and each other. Incorporating digital tools that students already use would reduce barriers to participation.

- Learning Objectives: We needed to complement the existing syllabus and course activities, setting out clear goals for student learning through participation in the ARG.
- Resource Investment: Resources allocated for designing, running, and evaluating game play should not detract from the administration of the course.
- User experience: The technology tools and platforms used in the game should allow students to collaborate to complete game-related tasks. In addition, story line elements and character interactions students experience shall not be distressing in any way.

Using these design domains to analyze the data gathered from the instructor, TAs, and former course participants, we prepared an initial outline for a pilot iteration of the game.

## 6 Game Outline

Based on data gathered from the instructor, TAs, and former students, as well as design domains outlined above, we suggested the following elements for the design for the ARG experience in the informatics course:

### 6.1 Design domain: Structure

Game duration was set at two weeks based on instructor preference and feedback from TAs. The two-week period will include four distinct “levels” of task completion.

Virtual spaces used will include a game content website, the course website, as well as Google documents, in which students can collaborate and complete information synthesis tasks to advance game play.

### 6.2 Design domain: Learning objectives

The syllabus topic chosen for the focus of the game is Value-Sensitive Design (VSD; Friedman et al., 2008), and the game tasks will give students applied practice using VSD for a specific design problem.

Applied practice is emphasized in the game design. VSD is a subject students will learn with more mastery in an experience that allows them to create, rather than consume, content (Gee, 2003). The VSD topic also occurs early in the academic quarter for this course, before midterms, thereby increasing the capacity for students to participate in game play.

### 6.3 Design domain: Resource investment

The game’s puppetmaster will be played by a graduate teaching assistant. This TA will run the game website, track student participation, and interact with students as the main game characters.

The course instructor will direct students to the virtual help sources in the game if they ask for help, experiencing minimal additional work in running the game.

Undergraduate TAs for the course will monitor student discussions on the course website and send any relevant questions or content to the game puppetmaster.

### 6.4 Design domain: User experience

Participation in the game will be encouraged, but voluntary. Incentives for participation in the game will include public (to the course website) player rankings that will indicate contribution and mastery of the subject material. Extra credit will also be awarded for participation.

Two characters will guide the students in completing game tasks: Dorothea, an alien being, and Professor Ren, a fictional information science professor. We chose a female and a male character to include all students equally.

The entry point (a URL) to the game narrative would appear on both the course website and during class on lecture slides, leading students to the website of the first character, Professor Ren.

The narrative will begin with Professor Ren asking students for help in designing a communication tool for a lost and wandering alien, who calls herself Dorothea. The game is divided into four major components. First, students assemble a list of existing communication tools and organize them by capabilities, to Professor Ren's satisfaction. Second, Professor Ren will introduce VSD to the players concurrent with the VSD lecture topic in class; the character will then assist students in making a list of questions to ask Dorothea about her communication values, based on the VSD framework. The third and fourth components of game involve synthesizing Dorothea's user requirements and values into a solution for her.

Success in the ARG will be tracked by the game's puppetmaster, and the Professor Ren character will use his in-game "authority" to rank players publicly, giving students a feeling of achievement and mastery.

## 7 Future Steps

We plan to give students the opportunity to gain a feeling of mastery in Value-Sensitive Design, an important theoretical concept that they will have applied to a practical problem through game play. We intend to run a first iteration of the game as proposed in this paper. Player and student feedback will be welcomed as part of the game's evaluation, and we hope to implement an engaging experience to this course to enhance student learning in the future. In the future, we will share the elements of the game that prove more or less successful, with the intent of inspiring more widespread incorporation of gaming experiences in the postsecondary classroom.

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