Alternate Reality Game Training for Leadership Education

Alice Leung, William Ferguson; Lisa Scott

BBN Technologies; ARL

Cambridge, MA; Adelphi, MD

aleung@bbn.com, wferguson@bbn.com, lisa.m.scott92.civ@mail.mil

Ethan Mollick

Wharton School, University of Pennsylvania

Philadelphia, PA

emollick@wharton.upenn.edu

ABSTRACT

Alternate Reality Games (ARGs) offer some unique capabilities for teaching skills related to teamwork and leadership, particularly in the realistic context of tasks and working relationships which evolve over days or weeks. This paper reports on the results and lessons learned from two semesters of deploying an educational ARG-based activity within an MBA course. We describe the pedagogical goals, development of a reusable platform for deploying educational ARGs, scenario design, level of effort needed to administer the game, learner interactions, and learning results. Because some features typical in entertainment ARGs are likely to cause pedagogical or logistical difficulties, the ARG paradigm was modified to address such challenges. For example, a standard characteristic of ARGs is that the majority of participants act as passive observers rather than actively contributing to group work products, potentially negating the benefit of "hands-on" learning. To address this issue of low average participant activity, the instructor simultaneously deployed many parallel "shards" rather than a single instance of the unfolding scenario. Running multiple separate instances of the event facilitates greater average participant activity, but also demands different technology infrastructure and event administration. We also describe the impact of different levels of player anonymity. The learning experience was more successful for groups participating using player-selected pseudonyms, compared to groups participating using their real names or using assigned anonymous identifiers. This effect may be related to participants being more willing to explore a challenging activity when their real identity is hidden, and being more invested after selecting their secret identity. Finally, we discuss future directions and how the overall design approach and framework could be applied in military education.

ABOUT THE AUTHORS

Alice Leung, Ph.D. is a Senior Scientist at BBN Technologies. Her main research interest is the application of game-based technologies for shaping and measuring human behavior. She is currently the integrated experimentation lead for the ARL Network Science CTA, exploring how to improve experimental capabilities for understanding social/cognitive, information, and communications networks. Previously she was the principal investigator for IARPA projects on serious games for mitigating cognitive biases and immersive interactive narratives for cross-cultural understanding. Prior work also includes the JFCOM/DARPA Helical Training project to apply concepts from Alternate Reality Games to military training needs and the DMSO/AFRL SABRE project to develop a game-based testbed for cultural behavior modeling and team performance research.

William Ferguson is a Lead Scientist at BBN Technologies in Cambridge MA with expertise in artificial intelligence, cognitive science, games and computer-based training. He served as the Principle Investigator for the BBN IMMERSE project under DARPA's SSIM program, which created an embodied synthetic environment for practicing cross cultural, social skills. He played a principle role in the DARWARS project, a DARPA-funded program to revolutionize computer-based training for the military by exploiting ideas and technologies developed in the commercial gaming world. He was co-principle investigator of the Helical Training project which exploited the experiences provided by Alternate Reality Games for pedagogical use.

Lisa M. Scott is a computer scientist with the Computational and Information Sciences Directorate at the U.S. Army Research Laboratory (Adelphi, MD). Her main interest is software development and experimental design. She was a software developer under ARL's Network Science Collaborative Technology Alliance (NS CTA) component based routing task, working to implement a software framework to interchange routing components based on the

communication environment to produce dynamically robust routing protocols. Currently she is working on the NS CTA quality of information and experimentation thrusts.

Ethan Mollick, PhD is the Edward B. and Shirley R. Shils Assistant Professor of Management at the Wharton School at the University of Pennsylvania. He studies innovation and entrepreneurship, and the ways in which an individual's actions can affect firms and industries. His research includes early-stage entrepreneurship and crowdfunding; the way in which communities come together to innovate; and the factors that drive the performance of entrepreneurial companies. He has published papers in leading academic journals, and he has among the 50 most downloaded authors (out of over 300,000) on the Social Science Research Network for the past three years. He was named one of the "40 Most Outstanding Business School Professors Under 40" and was awarded the Academy of Management (TIM Division) Emerging Scholar Award. Prof. Mollick also co-authored a book on the intersection between video games and business that was named one of the American Library Association's top ten business books of the year, and has studied the way that games can be used to motivate performance and to educate. His entrepreneurship simulations and games have won several awards, and are used by tens of thousands of students around the world.

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Ethan Mollick

Wharton School, University of Pennsylvania

Philadelphia, PA

emollick@wharton.upenn.edu

BACKGROUND

The genre of Alternate Reality Games (ARGs) is less well-known than first-person shooter, real time strategy, role-playing, or massive multiplayer online games. Unlike the more established types of computer games, ARGs do not involve any digital environments that simulate physical maps and terrain, and players do not control the physical actions of virtual avatars. There are no game control interfaces; instead, players engage with ARGs using email, web pages, phones, or other types of real-life communications modalities. Rather than control the actions of a digital avatar, participants simply engage in the game the same way they engage with real-life online activities. The main focus of ARGs is also different from most other types of computer games. Players are generally expected to collaborate with each other to solve mysteries, uncover truths, and overcome puzzles. The games usually unfold over weeks or months, with sporadic asynchronous interactions between players.

Another key different between ARGs and most types of computer games is that like a Command Post Exercise, ARGs rely on a team of human controllers to adapt the course of events and play the roles of various characters in the narrative. Similar to a military exercise's use of a red team and white cell, an ARG is run by "puppetmasters" who surprise the players with new challenges. In the fictional narrative of an ARG, the main protagonists (whom the players are trying to help) and the main antagonists are played by the puppetmaster team; the interactions of these non-player characters (NPCs) with the participants is the primary method for injecting events and advancing the narrative.

ARGs have primarily been used for entertainment or as part of advertisement campaigns. Early examples of the genre included independent, non-commercial games whose creators were motivated to pioneer uniquely immersive experiences that blurred the lines between fiction and reality (Szulborski, 2005).. The entertainment industry was attracted to ARGs as a novel viral way to create excitement and engagement around their products/properties (REFS). A few "serious games" proponents have explored ARGs for public education/awareness (McGonigal, 2011), and staff-level training (Leung et al., 2008).

Because ARGs are so different from many other types of computer games, they offer a simulation approach that is uniquely suited to some educational and goals. For professions where individuals work in distributed teams to achieve group objectives over many weeks, with the bulk of day-to-day activities using a computer, an ARG may offer the most natural and high fidelity type of simulation. ARGs can be used to simulate the process of moving from data to information to knowledge to decisions, allowing participants to practice related skills. They can also provide a sandbox for exploring ad-hoc team dynamics, emergent/informal leadership, negotiation, and coordination.

ARG simulation techniques are a useful addition to other experiential learning activities. In contrast to case studies which focus on close examination of historic decisions made by others or problem-based learning which focuses on dispassionate analysis, ARGs are more immersive and require learners to make real-time decisions about what to do. In contrast to system model-based experiential learning games which focus on understanding the emergent interactions between different parts of a system (e.g. supply, demand, and inventory), ARGs focus on person-to-person interactions that may take place over a long time period.

In the rest of this paper, we present a case study of using a modified ARG-based simulation as part of a course on entrepreneurship at the Wharton School, University of Pennsylvania. This course is part of an MBA curriculum,

with the typical student having already completed an undergraduate degree and interested in a management or business career. A total of 270 MBAs, undergraduates, and part-time students have participated in this simulation, across several semesters. We describe how an ARG scenario was designed for this particular educational context, illustrating some general principles of educational ARG scenario design. We also introduce the LookingGlass Platform for educational ARGs, and explain how its capabilities help overcome some of the challenges of ARG-based pedagogical exercises. Finally, we discuss some of the learning outcomes from this exercise and consider how ARG-based exercises could be incorporated into different learning and training environments.

THE LOOKINGGLASS PLATFORM FOR EDUCATIONAL ARGS

ARGs designed for entertainment or publicity do not require any special platforms or frameworks, beyond those used for regular electronic communication (e.g. discussion forums, wikis, email, websites). However, pedagogical purposes impose some additional requirements for the design of educational ARGS. The Wharton School's LookingGlass platform helps address several of these key challenges:

- How to provide high quality learning experiences to as many participants as possible.
- How to balance structured learning with exploratory learning.
- How to create a productive feedback and improvement cycle.
- Managing the amount of staff effort required for execution.

Flattening the Participation Curve

Participation in a typical ARG is extremely uneven; there is a small number of actively engaged players and a large number of passive observers. (A typical participation curve is illustrated in Figure 1.) As a result, while the core group of extremely engaged players may have a deeply meaningful transformative experience, the vast majority of players do not have a significant learning experience. This skewed participation distribution is driven by the design of a typical ARG as a single large collaboration. The few players who are willing and able to devote the most time to the game as it unfolds in real time will do all the necessary work and make all the key decisions. A key innovation of the LookingGlass platform is to support multiple simultaneous alternate realities, flattening the participation curve by providing motivation and opportunity for all learners to actively engage.

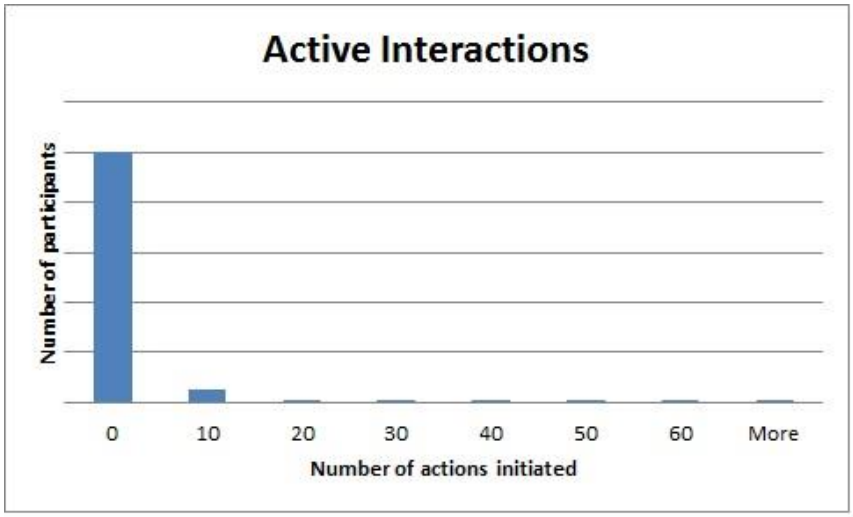

Figure 1. For a notional typical ARG, a histogram breaking down the number of participants per level of activity would show that the vast majority of participants engaged in no active interaction.

At the beginning of an ARG-based exercise launched on the LookingGlass platform, small groups of participants are assigned to separate fictional worlds. The same fictional scenario unfolds in each world simultaneously, but only the participants assigned a particular world are able to affect its future. Thus, though each world begins the same way, the actions of the different groups of participants results in different paths and final outcomes. Participants can only interact with other participants in the same world, and with non-player characters (NPCs) controlled by the

puppetmaster team. The LookingGlass helps the puppetmasters keep track of how each world has diverged, so that the NPCs can react appropriately.

Division of the participants into separate worlds creates a more even ratio of players and NPCs, providing ample opportunity for every participant to make important decisions and take key actions in the narrative. Additionally, it makes it difficult for any participant to "coast" on the efforts of others. As a named member of a small team, each participant feels significant social pressure to contribute.

Because participants in the Wharton ARG exercise were playing the game as part of an optional course assignment, the instructor was also able to set a minimum expected level of participant activity. Each player had to agree to devote at least two hours a week, spread over at least three sessions per week, during the three-week exercise. Additionally, participants knew that they would be asked to rate their teammates at the end of the exercise. Both the explicit minimum time commitment and the anticipation of peer ratings helped provide additional impetus for active engagement.

The quality of the exercise was also improved by structuring the exercise as an optional activity and giving students the choice of either participating in the game or completing and alternative assignment. Allowing students who were reluctant to engage in the simulation to opt out was a tactic that minimized the number of unenthusiastic players. Since each participant's experience in a small-group ARG is significantly impacted by the attitudes of their fellow players, including only participants who opt-in and are likely to express more positive attitudes during the exercise helps create a reliably high quality experience for everyone.

Freedom and Constraint

Early ARGs cultivated a deliberate sense of enjoyable confusion about the boundaries between fictional and real-world information because the target players relished the mystery of not knowing the real purpose of the game, how long it would run, and what they should do to succeed. When ARGs began to be developed for a more general audience, the deliberate cultivation of confusion was somewhat reduced, while retaining the central game goal of figuring out what was happening. Education ARGs can take advantage of this central ARG paradigm to provide opportunities for participants to grapple with relatively unstructured tasks and improvise to handle unexpected challenges.

However, educational ARGs should minimize any confusion that does not serve a learning goal. For example, because students are more motivated when they understand the purpose of any simulation exercise, the ARG narrative and player roles should be clearly related to the course curriculum and explicitly communicated prior to the start of the event. In the case of the Wharton exercise, students in an entrepreneurship course were told that they would play the roles of promising MBA students recruited to join a technology startup company to assist the founder in preparing a pitch for venture capital funding. Thus, students could immediately see the relevance of the topic of the simulation with their own learning objectives.

Instead of the traditional ARG approach of allowing participants complete freedom to decide how to play, the Wharton exercise and LookingGlass Platform were set up to provide some initial structure and guidance for how to engage with the material. Participants were given instructions for logging onto an exercise web site which provided in-game email, chat, and file sharing capabilities (see Figure 2 for screenshots). They were also strongly encouraged to attend an online chat meeting scheduled on the first day to introduce themselves to their teammates. Through their in-game email, they were contacted by several fictional NPCs, and given some initial events and requests to catalyze team discussion. By presenting early "hooks" into the narrative, the exercise was designed to minimize any confusion about how to participate and to reduce participant inhibition about engaging in fictional roleplay.

The Wharton exercise was also set up to use the freedoms of the ARG paradigm to provide an opportunity for exploratory learning. For example, though the participants were explicitly told that they needed to develop a pitch deck by the deadline, they were not told how to do the necessary research or how to divide up the work. To encourage the players to explore group self-organization, an NPC asked them to devise the equity division for the startup, and part of the standard venture capital pitch format includes specifying the company's leadership and organizational structure. As an impetus to exploring creative problem solving, the narrative also included challenges with no obvious right answer, such as a product manufacturing schedule that would not satisfy market demands, and

a mixture of contradictory and hard-to-meet beta tester feature requests. By including later opportunities for unstructured problem solving after setting out well-defined end goals and explicit instructions for how to start playing the game, this education ARG incorporated both directed and exploratory learning.

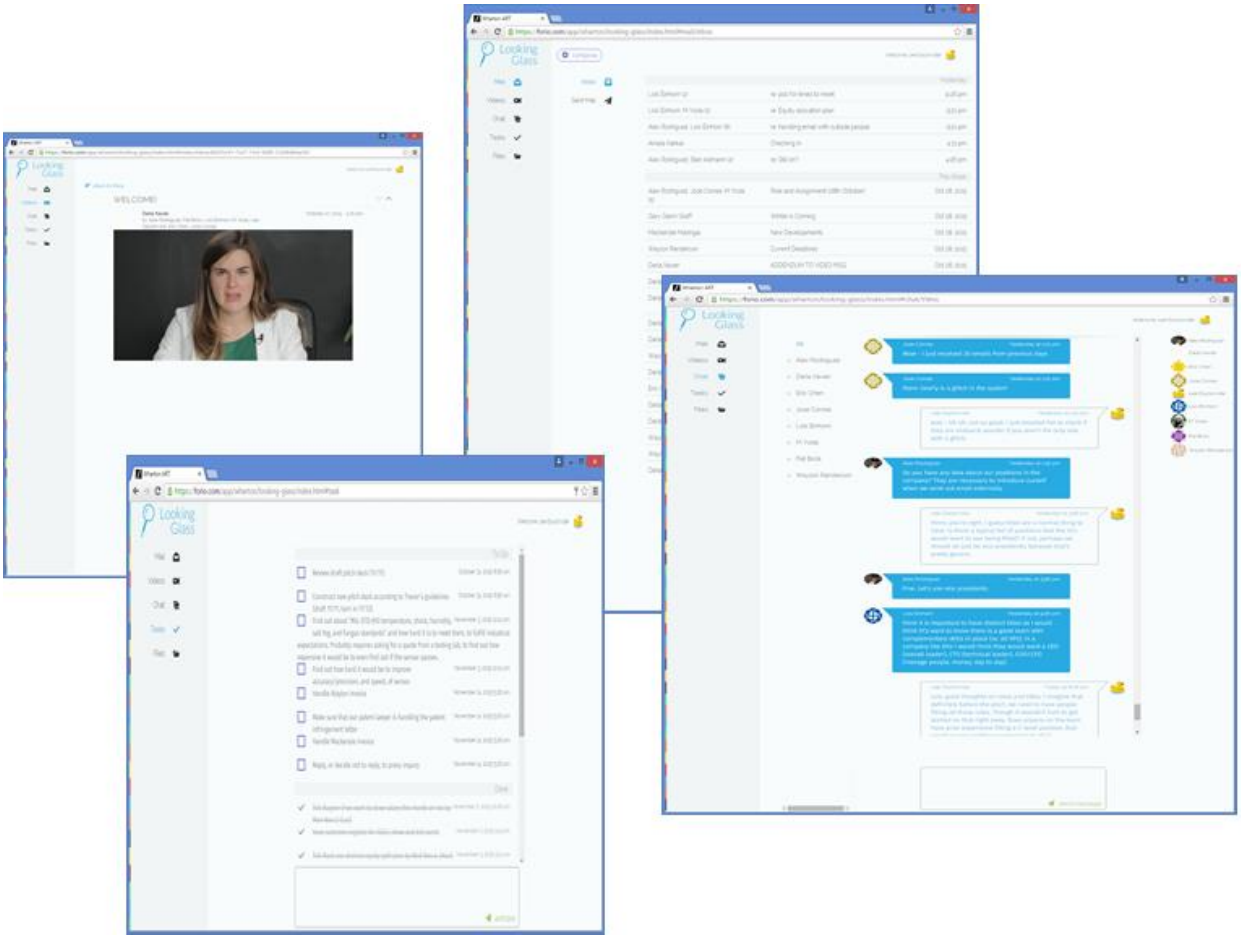

Figure 2. The LookingGlass platform supports online synchronous and asynchronous interactions within an ARG scenario.

Feedback and Tracking

Long time-frame learning simulations, such as educational ARGs, are valuable because they can exercise skills and knowledge within a naturally unfolding time scale. Longer simulations should provide some type of immediate intermediate feedback to participants during the course of the simulation, so that learners have a chance to correct and learn from any early missteps. The ARGs paradigm includes several inherent mechanisms for intermediate feedback, such as positive versus negative reactions from other players and NPCs, and positive versus negative narrative consequences. The LookingGlass Platform adds several additional means of intermediate feedback which stand outside of the game narrative.

The LookingGlass's explicit feedback mechanisms include a type of leaderboard showing badges for team achievements across each world (see Figure 3). This allows players to see how their team's success in handling a series of challenges to their technology startup compares to others. In addition to encouraging a gentle sense of competition, the intriguingly titled achievement badges are design to arouse curiosity about alternative approaches to the common challenges. The LookingGlass also enables direct feedback from course teaching assistants (TAs) on some of the intermediate deliverables. While the same sort of feedback could also be introduced as coming from the fictional NPCs, separating it out as explicit TA commentary gives the feedback more authority. The Wharton

exercise combined external motivation (grades/ratings) with narrative encouragement of internal motivation through topic relevance, team interdependence, and NPC appeals to participant expertise.

In addition to enabling instructors to provide feedback during the simulation, the LookingGlass facilitated tracking/monitoring of participant engagement and performance. All participant emails, chats, and in-game documents were accessible to instructors. This enabled TAs to give students a participation grade, as well as assessing team work products. If desired, instructors would also identify students who missed early opportunities to engage in the simulation, for individual follow-up or intervention.

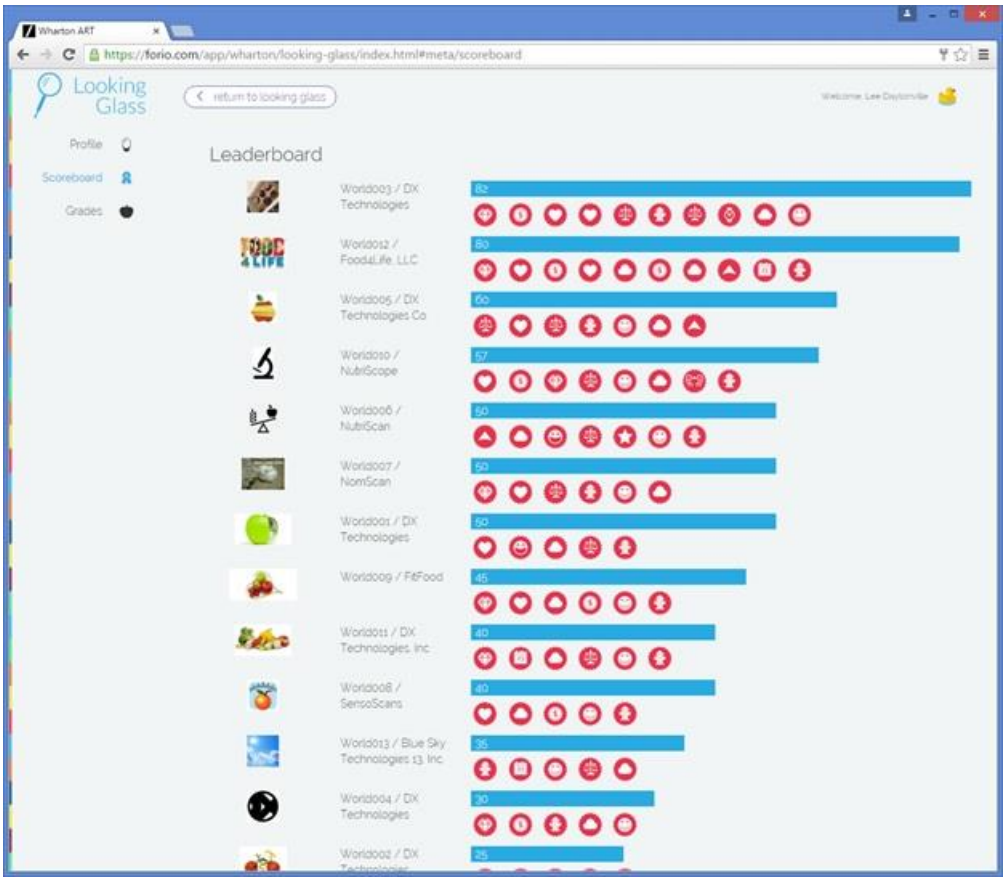

Figure 3. A team leaderboard provided motivation and feedback during the simulation.

Managing Execution Effort

ARGs are usually created as single-use events. Since they typically invite any members of the general public, it is usually infeasible to avoid "spoilers" for a repeated event. ARGs Publicity campaigns or advertisements are generally tied to a specific movie or other entertainment product, so there is little motivation to repeat the event. Thus, little custom infrastructure for either ARG design or execution have been developed. In an educational context such as a course offered every semester, the initial ARG design effort can be amortized across repeated events, but it is even more critical to control the simulation execution effort.

The LookingGlass Platform is designed to help manage execution effort by supporting pre-scripted event injects (such as emails sent from an NPC at a preset time) and making it easy for puppetmasters to switch between NPC accounts when tailored email responses are required (e.g. to conduct a negotiation or answer questions). In one run of the Wharton exercise, there were approximately 90 participants divided among 14 teams/worlds. This exercise was conducted by one full-time puppetmaster handling bulk of the tailored NPC interactions, with technical support from the platform software team and grade inputs from the course TAs.

SCENARIO DESIGN PRINCIPLES

In this section, we discuss the two key principles of pedagogical ARG scenario design and how they guided creation of the Wharton scenario. These principles are to:

- Target relevant skills that fit the ARG paradigm.
- Maintain engagement and motivation.

Pedagogical Goals

Because an ARG is so much more open-ended than a typical computer game, it is particularly suitable for addressing skills related to handling uncertainty. This can include decision-making with uncertain and incomplete information, group dynamics for collaboration when there is no preassigned organization or roles, adapting to unexpected events, developing compromises, and improvising solutions with limited resources. The Wharton scenario focused on the challenges of launching a technology startup, a situation where all these skills could be exercised naturally within the course of events.

The instructor designed the set of events based on real-world examples of successful and unsuccessful startups, creating a realistic and believable sequence of decision-making under uncertainty challenges to pose to the teams. As with most real-world business decisions, there were some facts that were difficult to assess (e.g. the true intentions of competitors, or the potential market for a new product). While some amount of investigation could produce additional data, in many vignettes within the narrative, players had to transition from data gathering to information assessment, and from brainstorming options to selecting a course of action. The scenario designers, by including decisions of realistic complexity, necessarily featured uncertainty.

The decision-making process was complicated by the deliberate lack of any assigned roles or formal organization among the players. In fact, deciding on a process for group decision-making and then deciding on a company organization (e.g. selecting a CEO) was one of the challenges. Whether teams fell into a default model for collective decision-making or whether they explicitly evaluated alternative models before selecting one, teams had to figure out how to proceed with no designated authority figure. Many players (37%) identified general team management as the most difficult challenge for their team. While many real-world organizations (particularly the military) do have a formal hierarchical structure, there are still many ad-hoc groups within and among such organizations, so the instructor felt it was an important to catalyze reflection and discussion about how to achieve group success under such conditions.

Negotiation, flexibility, and finding win-win compromises are central skills for the business domain, but also many other domains where customer/consumer requirements must be balanced with provider capabilities and resource limitations. The Wharton scenario included a variety of NPCs to present the team with partially conflicting requirements and capabilities, so they would be caught between what potential customers want and what manufacturers or suppliers could deliver. By featuring several such situations with no obvious solutions, the scenario was designed to encourage players to ask more questions about hard versus soft requirements, and seek compromises and partial solutions.

Motivation and Engagement

To deliver a learning experience, a simulation must be interesting enough to hold participants' attention. This level of interest can be achieved through a mixture of responsiveness in the simulation, depth of content, and aesthetic appeal. The Wharton exercise, like most ARGs, delivered responsiveness through a mixture of player-to-player interactions, NPC-to-player interactions, and narrative consequences. In contrast to typical ARGs, the limited player population of each world facilitated individual interactions and relationship formation among players and between players and NPCs. The LookingGlass further facilitated player-to-player interactions by including interface shortcuts for emailing all the other members of the team, and for engaging in group text chat. NPCs supported players acting as gatekeepers or liaisons for the rest of their team by responding to individuals rather than the group when players emailed them without copying the entire team.

The aesthetic appeal of the experience included the look and feel of the LookingGlass player interface, and the production quality of the fictional documents, videos, and webpages in the game. The player interface was designed to be similar to real-world remote collaboration platforms, and to be usable without instructions. Content developers engaged actors, graphic artists, and writers as necessary to produce believably high quality simulated media.

One way the scenario achieved depth of content was using the ARG technique of planting fictional web pages (e.g. LinkedIn profiles, news articles, company websites). Another method was to prepopulate the team's file share accessible through the LookingGlass with a variety of technical, business, and publicity materials relevant to the startup. Most of this content was not critical to the main narrative, so participants at the lower range of activity could easily skip it. Participants seeking additional engagement had the opportunity to dig deeper, and then share their discoveries with the team. Finally, the exercise maintained interest by injecting new challenges throughout the course of the event, so that players always had something new to consider.

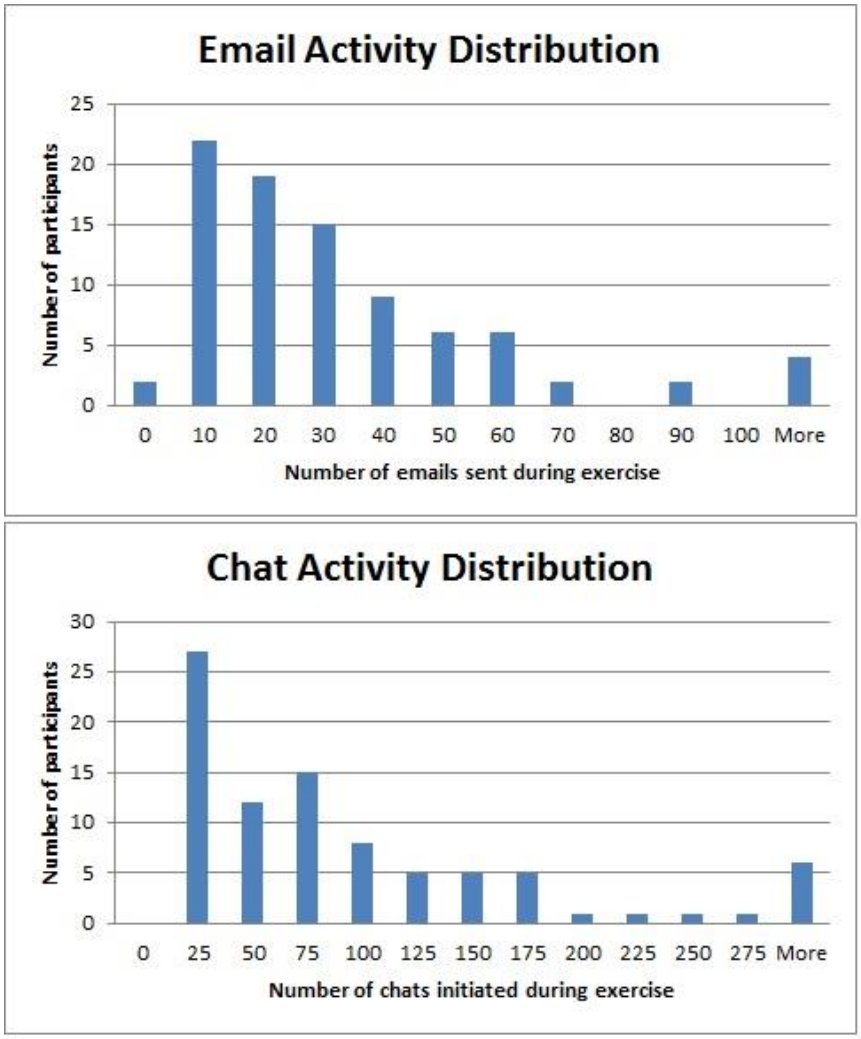

Figure 4. Most players initiated some chats and emails

PARTICIPANT INTERACTIONS AND LEARNING RESULTS

The Wharton exercise was successful in engaging the majority of participants and in spurring most players to initiate actions in the game. This is a significantly different activity level distribution than is typically seen for entertainment or advertisement ARGs, and shows that educational ARGs can achieve good participation. Over the course of several three week simulation runs, 270 participants initiated over 30,000 chat or email messages. Examining one

run with approximately 90 participants, there was a broad distribution of activity levels, with a small number of extremely active players (see Figure 4). However, unlike typical ARGs, the majority of players initiated some interactions by sending email or engaging in text chat. The explicit minimum activity expectation was 9 days over 3 weeks; the majority of participants initiated activity on at least 9 days (Figure 5).

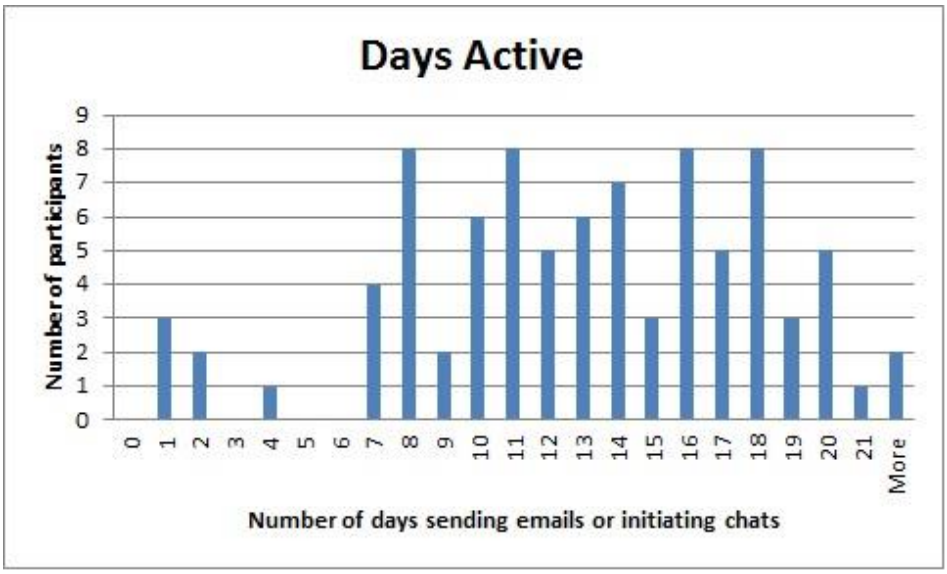

Figure 5. Most players interacted with game multiple times per week

Player assessment of the simulation was generally positive. In a post-exercise surveys, participants were asked to rate their overall experience with the simulation from 1 to 5, with 5 being the most positive response. With nearly an 80% survey response rate, the average participant rating was 3.4 out of 5. The average rating for simulation engagement was 3.7 out of 5. Participants agreed that the experience taught them about challenges for startups (4 out of 5), that they learned something it would be difficult to teach in a classroom (3.9 out of 5), and that they got a chance to practice things they learned in the class (3.4). Specific issues raised included the need for devoting significant time commitment beyond the minimum expectation in order to succeed with the deliverables, difficulty in team coordination, and issues with the interface.

Unless a team-based activity is successful in winning over any initially reluctant participants, there is risk that an unhappy player could adversely impact the entire team's experience by reducing immersion (e.g. making out-of-game complaints) or exerting negative peer pressure (e.g. mocking others for taking the game seriously). To mitigate this risk, students were allowed to opt-out by completing an alternative written assignment. Thus, the player base was self-selected for willingness to engage in a simulation activity. Targeted early intervention such as mentoring or outreach to players with low participation may be helpful if an educational ARG were mandatory.

Benefits of Pseudonymous Participation

In the initial deployment of the LookingGlass ARG-based learning simulation for this course, three different anonymity conditions were compared, with different teams being assigned to use either the non-anonymous, pseudonymous, or fully disguised personal identifiers. In the non-anonymous condition, participants participated in the simulation using their real names. In the pseudonymous condition, individuals selected their own fictional player names. They were encouraged to use names that would not be easily associated with their real identities, but were allowed to select names implying their choice of gender, ethnicity, or even a level of whimsy (e.g. names from popular media). Participants in the fully disguised condition were assigned random generic identifiers that did not sound like actual names and did not imply any gender or ethnicity.

The learner experience and level of participation was better under the pseudonymous condition. We believe that pseudonymous participation produced the best experience and outcomes because it allowed learners to:

- Experiment with different leadership and participation styles in a safe environment. By decoupling their activity within the simulation from their real-world identities, this condition encouraged exploration. Five of the top 20 students were women playing under male names, while four were men playing under female names. Relatively inexperienced students participated without the inhibition of being seen as unqualified.
- Quickly invest and engage. By giving the learner the freedom and responsibility to select their own pseudonym prior to the start of the simulation, this condition required participants to engage in a low-effort activity to increase buy-in.
- Maintain immersion. By using identifiers that mostly sounded like real-world names, this condition avoided giving participants the sense that they were constantly using code-names. Potentially, the use of obviously non-name identifiers in the fully disguised condition caused a break in immersion whenever players referred to each other.

FUTURE DIRECTIONS

The level of effort required to execute an ARG-based educational simulation is already manageable for the classroom scale; however, reducing this level of effort would make such simulations more accessible for both low-resource classrooms and large-scale educational deployments such as MOOCs. Wharton is developing a version of the LookingGlass platform that will maintain the immersive and interactive sense of simulation while significantly reducing and automating the exercise execution effort.

The approach will be to provide multiple choice options for interactions where the participants contact the NPCs. For example, when responding to an emails inquiry from the press with questions about a competitor, a player might select from several pre-written emails which exemplify tactics such as no comment, self-promotion, positive statement about the competitor, or truthful negative statement about the competitor. Each choice would lead to different consequences in the simulation, but the consequences could be automated instead of requiring a human puppetmaster to compose a free text response. Participants would still be able to use free-text email and chat to interact with their teammates, and would still receive (pre-written) natural language communication from the NPCs, but would not be able to send free form emails to the NPCs.

Because the LookingGlass already supports both within narrative and outside of narrative feedback, it could also support augmentation of an educational ARG simulation with another type of story-based learning featuring context-based lessons learned interviews with experts. In this type of augmented ARG, key player choices would lead to natural consequences within the simulation (e.g. a negative statement about a competitor might trigger a publicity backlash) and would also trigger access to short video recordings from real-world experts sharing an illustrative story of the consequences of a similar past mistake or triumph.

In addition to providing an educational experience for participants, LookingGlass simulations can provide instructors and researchers with information to understand or improve learning outcomes and team dynamics. In these educational ARGs, many individuals and teams experience a similar task, but take actions leading to different outcomes. Thus, when participant actions within the LookingGlass are analyzed along with outcome measures such as course and exercise grades, peer and self-ratings, and course participation/completion rates, we can understand what individual and team characteristics and dynamics lead to good outcomes. This information can be used to refine future educational ARGs, for example, by recommending pseudonymous participation. It could also be used to develop execution-time interventions to guide more teams toward productive dynamics.

CONCLUSIONS

The use of educational ARGs at the Wharton School at University of Pennsylvania has been successful. The majority of students found the simulation engaging and complimentary to traditional means of learning. Interactive learning through an ARG-style activity illustrates abstract concepts in a concrete context and provides opportunities to apply knowledge. The activity also catalyzes in-class discussion and demonstrates the relevance of course material. With pseudonymous play, the activity also provides a forum for students to explore new leadership and communication styles safely. This type of ARG simulation can provide a more controlled and introductory level of

experiential learning than the Stanford University Lean LaunchPad approach (which involves students quickly developing and testing their own start-up pitches by talking to real-world potential customers).

The LookingGlass platform is already useful for running simulations for up to a hundred students at once, using a small team of puppetmasters/TAs. In order to scale educational ARGs to support thousands of students at once while retaining the benefits of small-team interactions, Wharton envisions a modified approach that eliminates unstructured player/NPC interactions but still catalyzes unstructured player/player interactions. This new type of educational ARG would be particularly suitable for use in MOOCs and resource-constrained classrooms.

Educational ARGs could be used in military education to teach topics such as leadership development. Instructors at the US Military Academy and university ROTC programs might consider ARG-based simulation to teach staff level distributed coordination skills. Government organizations that work with NGOs might consider ARGs to catalyze relationship building and cross-organizational training without the commitment of setting aside dedicated training days.

We hope that our analysis of useful platform features and pedagogical design principles for educational ARG scenarios will encourage more educators to consider Alternate Reality Games as an approach for interactive simulation.

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