SASHA BARAB, TYLER DODGE, HAKAN TUZUN,
KIRK JOB-SLUDER, CRAIG JACKSON, ANNA ARICI,
LAURA JOB-SLUDER, ROBERT CARTEAUX JR.,
JO GILBERTSON, CONAN HEISELT

THE QUEST ATLANTIS PROJECT: A SOCIALLY-RESPONSIVE PLAY SPACE FOR LEARNING[1]

INTRODUCTION

Over the last decade, video games have become one of the most significant forms of media for the enculturation of youth, especially males. According to a Kaiser Family Foundation study, over 80% of homes have video games (Roberts, Foehr, & Rideout, 2005) and, according to a Pew Report, all college students interviewed had played a video game and nearly half of them play multiplayer video games regularly, breaking the myth that these games are isolating or anti-social (Jones, 2003). While few would disagree with the statement that children, and many adults, are spending large amounts of time and money playing video games, many would argue against the educational usefulness of the interactions that occur in these spaces or the significance of these interactions on the positive development of the children who play them.

Rather than simply being spaces for mindless play, we view many of these games as quite sophisticated and as being imbued with rich narrative structures, ideologies, and embodied practices that constitute game play (Squire, 2006). The linguist James Gee (2003), in particular, has documented the discursive richness, depth of collaborative inquiry, complexity of game play, opportunities for consequentiality, rich perception-action cycles, exploration of situated identities, and the complex forms of learning and participation that can occur during game play. At one level, curriculum developers and instructional designers can only marvel at the diverse ways these games support complex learning, thinking, and social practices.

In contrast to much of the rhetoric, not all games are anti-social and an increasing number of girl friendly games are being produced every year. Examples of successful non-violent games that appeal to both genders include *The Sims, Animal Crossing, Yoshi's Island, Zelda, Kingdom of Hearts,* and many others. Moreover, even games like *Barbie Fashion Designer,* while ostensibly lacking educational significance, can for some users connect with the larger *Barbie* narrative, including such empowering elements as the *Career Barbie* line. More generally, rather than simply being transgressive spaces for mindless killing and other nefarious behaviors, games are quite sophisticated and diverse in terms of the

plotlines and interactive rule sets enlisted. Squire (2006) refers to games as *ideological worlds* that communicate particular value systems and ways of interacting, and he provides numerous examples of games that engage players in complex problem solving and insightful, if not educationally valuable, plotlines. The game developer Peter Molyneaux refers to the spaces he develops as *ethical playgrounds*, in which players engage in particular actions that affect the actual dynamics of the game for better or worse depending on the actions the player chooses to engage. For example, punching a bully to reclaim a little girl's teddy bear or stealing an expensive antidote to save a sick friend.

Game developers, through the narratives underlying the games they create and through the rich interactions these games support, have become among the most influential storytellers for children today (Herz, 1997). One question that emerges is whether these are the storytellers whom we want educating our children. And while there clearly exist a number of computer games that emphasize character-oriented plots, highlight collaborative game play, emphasize issues of friendship and social relationships, and employ colorful graphics and playful rule sets, it is rare to find a game that advocates an explicitly pro-social agenda, especially if it is not one that sells titles. Further, while they may be benign or even empowering, they rarely are grounded in users' real worlds, and are not usually *critical* in orientation (see Barab, Dodge, Thomas, and Tuzun, in press). Additionally, though games exist with educational potential, there remain too few examples of computer games that would satisfy teachers and parents, appeal to girls as well as boys, support academic learning, and engage users in real-world issues.

The use of video games as an educational medium continues to entail issues of deep concern, including discrimination against girls and the commercialization of schools—with many video games still being designed to cater to the interests of white males, incorporating white male avatars in protagonist roles, presenting sexualized representations of women and tokenized representations of minorities, and framing participation within violent themes (Kolko, 1999; McDonough, 1999). To be sure, software manufacturers face a heady challenge in pursuing equity: showing that video games' mythological potential is at the whims of commerce. Herz (1997) explains, "the people transmitting their stories to the next generation aren't priests or poets or medicine women. They're multinational corporations. And they are not trying to appease the gods. They are trying to appease the shareholders" (p. 170).

Herein lies the irony of the promise of video games. The space available to youths to express their agency, according to Jenkins (cited in Laurel, 2002), has been reduced from several square miles to often a mere computer screen, yet even that domain is appropriated by commerce. As Taylor (2002, p. 229) wrote, "branding has assumed such a prominent role in our cultural lives that it becomes difficult to imagine spaces not touched in some way by corporatized signs." As Berger (1972, p. 131) explained, "publicity as a system only makes a single proposal. It proposes to each of us that we transform ourselves, or our lives, by buying something more." The divide resulting from commerce may not be easily overcome, for many consumers brand association is the road to societal

identification and inclusion. When commercial interests stake a claim in education, we must scrutinize the messages being communicated to children.

Central to our work in the Quest Atlantis Project (QA) has been designing a context for learning that sits at the intersection of education, entertainment, and social action. Designing to support social commitment and real-world action—what we call socially-responsive design (Barab, Thomas, Dodge, Carteaux, & Tuzun, 2005)—involves a range of issues, including gender representation. QA is an immersive context with over 3500 registered members from the USA, Australia, Denmark, Singapore, and China. The project is intended to engage children ages 9–12 in a form of dramatic play comprising both online and off-line learning activities, with a storyline inspiring a disposition towards social action. A core question underlying our work is whether we can reclaim the story medium in one of its contemporary forms—video games—to use in a socially-responsive way and at the same time avoid the problems currently associated with the use of this form.

A core challenge in our research has been to optimize the positive aspects of videogames and brand-identification in order to create empowering self-identification of students with a pro-social agenda, while at the same time fostering critical social engagement. Our perspective on design entails the assumption that the technology is only one aspect of the larger brand context through which the design bears meaning and potential. Central to our thinking is the understanding that QA is not simply a technological product, but rather it constitutes a socially-responsive brand that integrates technology as part of its identity. Given that member participation is situated in the context of a larger QA community, the "brand" of QA is one that is both individual and social. Here, we illuminate the complexity of features that we have used to establish this brand, demonstrating how we were able to develop a videogame brand that was useful even in the context of schools.

QUEST ATLANTIS AS A COMPLEX EDUCATIONAL GAME

The core elements of QA are 1) a 3D multi-user virtual environment (MUVE), 2) inquiry learning Quests and unit plans, 3) a storyline, presented through an introductory video as well as a novella and comic book, involving a mythical Council and a set of social commitments, and 4) a globally-distributed community of participants (Barab, Arici, & Jackson, 2005). QA was designed to foster inter-subjective experiences through structuring interactions, toward helping children to realize that there are issues in the world upon which they can take action (Barab, Dodge, Thomas, & Tuzun, in press). At the core of QA is the narrative about Atlantis, a world in trouble in the hands of misguided leaders. Participation in QA entails a personal and shared engagement with this narrative, as children contribute information and ideas based on real-world experience to the activists of Atlantis.

The narrative helps to establish continuity among the QA elements and helps to connect the fictional world of Atlantis with the real world, an act of interpretation performed by each individual child. Significantly, it is the narrative that provides the meta-structure of QA; the online technology is simply one of the ways in which

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participants are immersed in the narrative. While some projects wrap a rich context around the use of technology in order to make the technology and content more agreeable to girls, we have prioritized the context, with the technological structures being simply one element of the larger implementation. In the gaming industry, this larger frame—the meta-game—is the umbrella structure that gives unity and meaning to the underlying participant structures.

QA provides structures and experiences whereby students with little background in community participation can be introduced to the practice of social commitments as well as the inquiry process, while sheltered within an digital game-based context. The mythical backstory of QA, crossing the boundary between the Atlantian world and local contexts, motivates students to develop answers to social issues beyond their typically available experience. To participate in QA, then, is to engage in dramatic play characterized by learning, caring, and sharing of experience. Much more than the technological structures, this context additionally entails a rich collection of commitments, norms, participants, and interactions. This chapter will illuminate the complexity and sophistication of current videogames at the same time demonstrating that this medium can be used towards academic and socio-responsive ends.

The QA virtual environment, storyline, associated structures, explicit social commitments, and social policies constitute what is referred to as a meta-game context, a genre of play in which an overarching structure lends form, cohesion, and meaning to a collection of nested activities, each with its own identifiable rules and challenges (Barab, Thomas, Dodge, Carteaux, & Tuzun, in press). This meta-game serves multiple functions, providing a motivating context to stimulate engagement (entertainment), drawing on content and processes associated with various traditional academic disciplines (education), and instilling values in member behaviors (social commitments).

Like traditional role-playing games, this meta-context immerses students in role/identity–construction, but in contrast to these familiar games, in QA members' game identities and activities are dependent on their ability to participate in the real world as well as in the game-like context. Similarly, we are explicit about the kinds of values that we promote as good "gameplay," in contrast to games like *The Sims* that have only implicit values. Members learn about the QA storyline (the "Legend") and the underlying social commitments through a variety of media, including a video, a novella, a comic book, movie-style posters, and trading cards, and through a range of activities, such as through completing Quests, talking with other QA community members, and reading other resources in which more of the backstory is revealed. These varied media, more than simply structures for delivering the experience, are part of its overall meaning and help to establish the engaging experience that constitutes what is QA.

Central to this legend is that the people of "Atlantis" face an impending disaster: despite advanced technological development, their world is slowly being destroyed through environmental, moral, and social decay. The Council, led by a female teenager proficient with computers and a male teenager concerned with the environment, consists of three males and three females who are trying to save

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Atlantis. To do so the Council developed the OTAK, a 3D virtual environment that serves as a technological portal between Atlantis and other worlds. Through the OTAK, children from other planets can help the Council by engaging in Quests and sharing their experiences, wisdom, and hope. The Council hopes that today's youths with their adventurous optimism can contribute just the sort of knowledge that they seek. The slogan "Two Worlds, One Fate," appearing on the movie-style poster and in the novella, suggests that Earth and Atlantis have similar problems and similar destinies. While children know that Atlantis and the Council are not real, they nonetheless consistently engage the myth and storyline.

The Quest Atlantis community consists of both the virtual space and the face-to-face QA Centers. In order to participate in QA, children must be associated with a particular QA Center (i.e., participating elementary schools and after-school programs) and register online. Once registered, Questers may participate at a QA Center or from other locations with Internet access. As part of QA participation, each child is supplied a account that is connected to an avatar, with which she can respond to Quests (inquiry-based activities that include a task description, specific goals, and useful resources). An avatar is a virtual placeholder symbolizing one's identity and allowing interaction with the virtual space. Upon entering the virtual environment, referred to in the storyline as the OTAK (see Figure 1), Questers can travel to different worlds where they learn about the theme of that world, complete Quests, talk with other children and with mentors, and build their virtual persona through their homepage functions.

The 3-D space contains the different worlds created by the Council, and each world features several villages that present a series of challenges called Quests, which are designed to help restore the lost Atlantian knowledge. Each village reflects a theme (e.g., urban ecology, water quality, astronomy, weather) and houses a spectrum of Quests, ranging from simulation to application problems of varying levels of complexity. Consistent with national calls for inquiry-based mathematics and science learning, the Quests were designed in a manner that supports children (and mentors) learning the process of inquiry as well as domain-relevant content and concepts (AAAS, 1993; NCTM, 2001; NRC, 1999; Zucker & Shields, 1995). Further, using national standards generated by MCREL (online at http://www.mcrel.org/), we connected each of the 400+ Quests directly to one or more national standards and continue to work with districts to draw links to local academic standards. These features have proven central to attracting teachers and administrators. Each Quest is also targeted toward empowering children and their communities: while connected to specific academic standards, the Quests are rooted in our social commitments and are framed by the types of issues and interests that the children themselves have expressed. An important research question relates to how complex and "educational" these academic Quests can be while still engaging students.
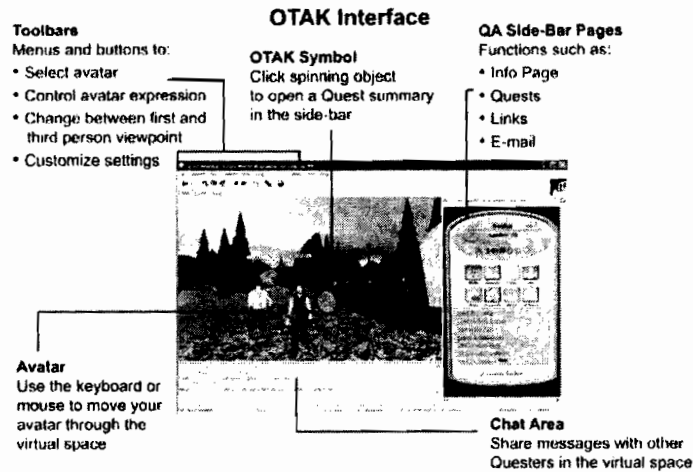
OTAK Interface

Toolbars
Menus and buttons to:
* Select avatar
* Control avatar expression
* Change between first and third person viewpoint
* Customize settings

OTAK Symbol
Click spinning object to open a Quest summary in the side-bar

QA Side-Bar Pages
Functions such as:
* Info Page
* Quests
* Links
* E-mail

Avatar
Use the keyboard or mouse to move your avatar through the virtual space

Chat Area
Share messages with other Questers in the virtual space

Figure 1. Screenshot from Quest Atlantis showing a virtual village on the left and a student homepage on the right

Completing Quests requires that children participate in academically meaningful activities, either in the real world (e.g., conducting environmental field studies, calculating rainfall) or through simulation (e.g., writing a story about travelling through various virtual biospheres, exploring a contaminated virtual environment and reflecting on lessons learned). Participants can select a number of these Quests based on their interests or as assigned by their teacher, if they are participating as part of a school project. Unit plans are two-week curricula composed of 5–8 Quests with a common focus or topic (e.g., water quality, environmental awareness). Submitted through an interface integrated with the client software, the children's work on Quests includes both content-area findings and personal reflections to foster retention, critical thinking, and meta-cognition. Both the content-based findings and the meta-cognitive reflections are assessed by teachers with expertise in the content area of the Quest. Through a Teacher Toolkit, teachers may create their own Quests, assign particular Quests for their students to complete, allow students to engage in Quests without overtly assigning them, or disallow specific Quests. Other functions include registering Questers, assigning reviewers to evaluate the children's responses, presenting points and customizable rewards to Questers, and monitoring their e-mail and chat. Through the Toolkit, teachers can facilitate the program and customize the experience in ways that suits the needs and interests of the particular class (Barab, Jackson, & Piekarsky, 2006).

THIS REPORTING

The focus of this reporting is to provide an overview of the QA context, describing these structures as an example of a game designed for academic learning at the same time illuminating the complexity that an academic game might take. As a context for learning, QA is not simply a technological innovation. We have referred to it as a "context of participation" in order to acknowledge the variety of resources and forms of participation that can take place as part of the QA experience. In this reporting, we examine the multiple forms of QA participation and discern the ways that these engage participants. As such, in this study we do not simply report differences with respect to a single form of participation, but instead report data related to the avenues of participation available to the QA participants. More specifically, we focus on a series of affordance trajectories that we believe games can leverage: learning and achievement, narrative engagement, identity development, collaborative participation, communication, and reflexivity affordance structures (see Table 1). By examining these multiple participant structures as opposed to just one or two of them, we develop a richer interpretation of participation in QA. The examination of these structures, taken collectively, will help to provide rich insight into multiple facets of the QA experience and, potentially, characterize a set of participant structures that others may wish to incorporate in their design work, especially if they are bringing together education, entertainment, and social commitments (Barab, Thomas, Dodge, Carteaux, & Tuzun, 2005).

Table 1. Quest Atlantis Affordances

Quest Atlantis Affordances	Elements
I. Learning & Achievement	Quests, Empathy
II. Narrative Engagement	Fixed Media, Media Interactions
III. Identity-Development	Avatar Choice, HomePages, Name Plaques, & Jobs
IV. Collaborative Participation	Collaborative Roles, Guilds
V. Communication	Chat, Email
VI. Reflexivity	Metacognition, Transactive Interactions

Participants from whom the data was derived consisted of individuals from the United States ($n = 2055$, inner-city = 128), Australia ($n = 924$), Singapore ($n = 60$), Demark ($n = 25$), China ($n = 50$), and Malaysia ($n = 28$). While some of the registration data make it difficult to determine registrants' core affiliation, there were approximately 2200 elementary school children in public schools aged 9–12, 300 children aged 9–12 in private schools, 150 children 9–14 year old children in after-school contexts, 450 undergraduate students, 50 teachers, and 10 staff in after-school contexts. In analyzing student participation, we have examined artifacts and various computerized records of children's communications, accomplishments, and choices in QA; we have also conducted dozens of interviews and multiple focus groups and have engaged in participant observation of dozens of classrooms as they used QA.

Below, we briefly overview these different data sources. At times, we statistically compared all 3279 registered Questers for whom we had data, but on some of the questions for which we conducted content analysis, the sample was

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simply too large to examine all their work. In these cases, we worked with a random sample of Questers and communicate the process of selection. In building qualitative interpretations, we used multiple raters and, where appropriate, inter-rater reliabilities were calculated. We used Likert-type questionnaires to help gauge the perspectives of 4th, 5th, and 6th grade students at one suburban school where we could directly interview students, and we also conducted some experimental studies, randomly assigning Questers to either the QA condition or a worksheet control condition to test the effectiveness of the QA context.

We developed pre–post assessment tests to examine learning gains and examined the number of Quests completed by children. Student responses in an experiment involving a personal narrative were also analyzed, with a .89 inter-rater reliability. To examine *narrative engagement affordances* within QA, we conducted focus groups to learn about their perspectives of QA fictional stories. The *identity development affordances* are represented primarily by quantitative data derived from the database logs with respect to each student's participation in the 3-D context. First, analysis involved examining the log files regarding avatar choices of both boys and girls. Second, Questers' customized homepages were analyzed. Third, participation through several structures in the virtual space was analyzed, including name plaques and applications for QA jobs.

Collaboration affordances involved examining chat logs to illuminate the various ways in which Questers collaborated with each other. Additionally, we examined Guild participation and the number of times both boys and girls broke allegiance with a Guild. *Communication affordances* included an examination of chat posts, QA emails sent, and telegrams sent. In addition to simply looking at overall quantitative differences, we also examined a subset of Questers to determine if they were more likely to engage in discourse with same-gender Questers. We also examined *reflexivity affordances,* focusing first on participants metacognitive reflections of individual Quests. Two raters, with an inter-rater reliability of .92, also examined the content-based reflections of a subset of students to discern gender differences in metacognition. From here, we looked at the participation of one particular Quester, showing how QA provided her an opportunity to reflect and transform her behaviors.

RESULTS

As of March 2004, 14 months after beginning the program, there were over 3300 registered Questers, including 1702 boys and 1609 girls. A number of registrants who serve as designers or researchers have been removed from any counts since they are not typical project participants. In terms of logins, individual girls have logged in on average 20.5 times ($\Sigma = 32, 960$) while boys have logged in on average 21.5 times each ($\Sigma = 36,643$). Unfortunately, it is not possible to tease out how many of these logins were voluntarily and how many were required in order for children to complete assigned work when participating as part of a class. Below we analyze differences between genders on the participation variables listed in Table 1 to characterize gender participation in QA. As described above, these data

include both quantitative and qualitative data to create a rich overall picture of gender participation.

I. Learning and achievement affordances

Quests. The most visible learning and achievement structure of Quest Atlantis are the individual Quests and larger unit plans, representing collections of Quests focused on a common topic. Overall, there have been approximately 10,000 individual Quests completed with about 20% requiring revision by the teacher. Statistically significant learning gains have been documented for unit plans in the academic disciplines of science, social studies and language arts. For example, with respect to science learning, elementary students who participated in a three-Quest unit plan on plant and animal cells demonstrated significant learning over time (Pre$M$ = 10.6, Post$M$ = 47.1) ($t(79)$ = 38.62, p < .01), with respect to their conceptual understanding of cells. Similarly, students' learning of world history in the context of QA went from almost no appreciation for how this content related to their own life (Pre$M$ = 10.30) to a deep appreciation of its relevance to their life worlds, and students showed the ability to adopt multiple perspectives in the international arena (Post$M$ =47.45) $t(19)$=10.28, p < .01). As one example of the types of changes occurring between pretest and posttest, the following illustrates a sixth grader's movement from a relatively superficial description to one of much more depth.

> *Pretest Response:* The trade of illegal drugs is an important issue. Poor farming families know they can make money off of selling illegal substances. Drug usage is dangerous and this is an important issue.

> *Posttest Response:* In many countries, rainforest logging is a major issue. People from wealthy countries such as our own might protest it because it kills so much of our beautiful environment, but in a country where fine rainforest wood is a major industry and especially if the countries economy is weak, its not really fair to say they can't do it anymore. This is a very controversial issue, because we are basically weighing human life and animal life, two things that depend on each other.

While the pretest shows an attempt to respond with a factual issue, it lacks the depth and complexity of the posttest, which shows multiple perspectives, considers economic and societal issues, and weighs contradicting factors. No gender differences were found on either these or the science measures of learning.

Empathy Experiment. Student achievement can also be examined through specific Quests, where again, girls and boys both show the program to be effective. In an experiment comparing the QA context with a simple online worksheet, students were presented with a personal narrative and asked to respond to four open-ended questions. This narrative was presented to half the students as part of QA and to the others simply as a worksheet. Student responses were analyzed for content, with a

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.89 inter-rater reliability. While student responses to several of the questions were similar for both conditions, when asked to engage in perspective taking, students in the QA condition offered character insights that were either deeper or better supported than did students in the worksheet condition ($t(14) = 2.62$, $p < .05$). Considering the developmental and epistemological roles of perspective taking (Batson, 1991; Hoffner, 1995; Ickes, 1997; Preston & de Waal, 2002), the QA program may bear important benefits.

Further, rather than being alienated by the videogame context, girls ($M = 137$ words) wrote significantly more than did boys ($M = 85$ words) ($t(18) = 2.55$, $p < .05$); considering that research has shown girls are made more anxious by computers than are boys (cf. Cooper & Weaver, 2003), this finding suggests that girls' use of technology within the QA context does not constrain their achievement. Moreover, the QA context seems to have positively benefited the boys, as they wrote more in the Quest condition than the worksheet condition ($ES = .74$), representing a medium-to-large effect size. Indeed, on the question concerning perspective taking, both boys and girls wrote significantly more in the QA condition (boys $M = 32.67$ words, girls $M = 38.20$) than the worksheet condition (boys $M = 15.88$ words, girls $M = 32.00$) ($t(18) = 2.17$, $p < .05$). Additionally, in terms of the question regarding perspective taking, girls (QA $M = 4.50$, Worksheet $M = 4.33$) overall offered character insights that were either deeper or better supported than boys (QA $M = 4.00$, Worksheet $M = 3.50$), regardless of condition ($t(18) = 2.55$, $p < .05$). Interestingly, while boys wrote less in the worksheet condition, boys in the QA condition wrote as much as girls wrote in the worksheet condition (see Figure 2). Considering that boys in general write less than girls do (Calvert, 2003), this suggests that QA can promote student achievement in a gender equitable manner.
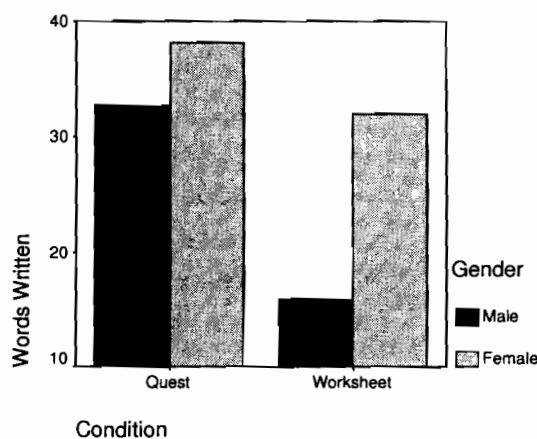

Figure 2. Condition by number of words written for boys and girls

II. Narrative engagement affordances

Fixed Media. While video games vary in the degree to which a narrative backstory is evident during gameplay, almost all games feature a narrative, which not only unifies players' activities within a common framework but also infuses their activities with an often rich and compelling storyline, replete with characters and settings, histories and possibilities. As mentioned before, the narrative backstory in QA is distributed across a range of fixed media, including not only an introductory video but movie-style posters, novels, printed and online trading cards, and a comic book as well. Indeed, the series of novels, involving the characters in Atlantis and children participating in QA on Earth, not only portray the history and current situation in the world of Atlantis but also communicates many of the norms of participating in the program. As one girl explained, the first novel made clear that "there is a reason for doing the quests." Because the novels represent the most robust narrative structure in the program, this discussion will focus on them to show how narrative can infuse children's participation—what seems to some to be just "playing a video game"—with interest, passion, and care.

Children's responses to the first QA novel were examined through a number of focus groups. Specifically, in an elementary school engaged in QA, one classroom that had read the first novel participated in four separate groups, and audio recordings from two of the groups were transcribed and analyzed qualitatively. As the focus groups revealed, the novel moves beyond being mere backstory to bring together the fiction of Atlantis, the Quest Atlantis program, and children's own lives. For example, many of the students mentioned that the book teaches about participating in QA, and beyond simply mentioning the connection between the story and the QA program, they expressed positively enjoying scenes when characters from either earth or the planet Atlantis discussed Atlantis and the Quest Atlantis program. The novel also connects with important aspects of children's lives. For example, because friendship is so central to their daily lives, the students expressed liking one of the Atlantian characters for his steadfastness: "he steps up for his friends." Similarly, many of the students recognized that the book addresses "life skills," a topic addressed weekly in their school, including "bravery, courage, and kindness."

Children's responses to a recurrent theme in the story—bullying—further demonstrate how the novel connects with children's own lives. In one scene, a clique of three girls verbally harasses another girl, and in a later scene, a boy bully physically taunts a weaker boy. Several students identified with the victims, explaining that "a long time ago, people were making fun of me," and "people made fun of my name...to make me mad." Similarly, several of the students found personal relevance in the girl bully and her infirmed father: one boy "related to [the girl] 'cause my mom had cancer but she survived," and another agreed, "I can probably relate 'cause my grandfather was in the hospital; he died." Moreover, these scenes brought the students to reflect on important issues in insightful ways. For example, some of the girls not only identified with the victim of the bullying but also appreciated that she responded without reciprocating the meanness.

Similarly, the scenes elicited critical self-reflection in some of the students: "sometimes you're mean to people that aren't in your little circle of friends." In these ways, buttressing activity in the virtual environment with a rich narrative served to enrich children's participation in the QA program.

Media Interactions. In addition to the more fixed media (introductory video, movie-style posters, novels, printed and online trading cards, a comic book), the narrative also is revealed through participants' interactions through media. Students exchange email with the principle characters in the Atlantis backstory, converse with them in the virtual space, post messages on the characters' Web-logs, and even create their own sites on the World Wide Web discussing QA and the legend of the world Atlantis. Through these media interactions, children relate to the characters with an easy sociability and sincere curiosity. For example, meeting Alim (the fictional girl at the center of the Atlantis narrative) inside the virtual space, a child asked her, "Do you ever get to do Quests? How often do u get on [log into] QA?" Similarly, in an email to the same character, one student wrote, "Hi, can you be my friend?" Indeed, Questers frequently include these characters in their list of friends in QA, alongside their classmates and other acquaintances. Further, children not only move easily between their own world and the narrative of Atlantis but also often connect with the narrative backstory in deeply personal ways. For example, through writing poetry, one student showed poignant and creative understanding of the Atlantis backstory, in which a cultural monument—the Arch of Wisdom—was destroyed. The poem concluded with the lines, "The grass shrank / The sun set / in the morning / and faucets ran dry / The world stopped spinning / when the Arch of Wisdom / shattered.

Children's interactions with the Atlantian characters through the characters' Web-logs represent an important form of engagement with the narrative because children can discuss topics that they consider important to both the characters and themselves. Moreover, these discussions typically demonstrate the socially responsive norms of the program—perhaps more so than most of the other media interactions. For example, responding to an article in which a character discussed mercury pollution on Atlantis, one boy wrote, "I'm sorry to hear that Lan. I wish I was there and could help. On Earth we have recycling. Recycling is when you get ride of stuff you used and then it gets reused." Seven weeks later, the same boy responded compassionately to a Web-log article about the 2004 tsunami. The Atlantian character had written, "I'm planning on giving some of the money I received for the Holidays for the relief efforts." In turn, the boy wrote to the character, "I hope your money gets to Asia in time. I also hope that all of the Questers in Asia are all alright. I also feel very sad for the people affected by the tsunami. I wish there was some way I could help." Similarly, another student responded to a Web-log article about street art, such as singing, reciting poetry, and making posters. Again moving easily between her own life and the narrative of Atlantis, the student wrote to the character, "Your writing is very interesting Alim. I think street art is a good way to express your feelings too! I feel so sorry that Atlantis is being destroyed!!!!!!!!!"

III. Identity-Development Affordances

There are multiple ways in which Questers can represent themselves in the virtual environment of QA. Through these different means, Questers can develop online personae (Turkle, 1995), but unlike most MUVES, these online personae are not simply fictional characters with little connection to real-world identities. In this section, we focus on four of these structures: choosing one's avatar, putting one's name on the QA wall, filling out one's homepage, and purchasing and building on the virtual land.

Avatar Choice. When Questers login to QA, they appear in the virtual environment as an avatar with attributes chosen by the Quester and persisting from one session to the next. Using the "avatar creator," Questers can choose a female or male avatar, customize hair and skin color, and select one of six clothing or body styles: adventure, punk, sport, summer, winter, and formal. Five of the clothing style choices are very similar between male and female avatars, but the "formal" type is an exception: male avatars have a tuxedo, and female avatars have a pink prom dress. We collected data from a single point in time showing the current avatar being used by each participant. After eliminating data regarding researchers and participants who had not yet used the avatar creator, we were left with 988 participants, including 507 females and 481 males—the Avatar Creator was a fairly recent introduction to QA, being only four months old when this paper was written. These were then sorted into categories based on chosen avatar style (see Table 2). The chi-square statistic of the difference between the avatar choices of female and male participants was strongly significant ($X^2 = 77$ ($df = 6$), $p < .01$).

Table 2. Count of avatar styles

Gender	Avatar Style							
	Adventure	Punk	Sport	Summer	Winter	Dress	Tuxedo	Σ
Female	75	63	64	38	63	193	11	507
Male	41	107	130	41	61	15	86	481
Σ	116	170	194	79	124	208	97	988

Among males, the "sport" style was the most popular, followed by "punk," whereas female participants chose the pink dress style far more often than any other. Also, overall, boys' self-representations show more variety than those of girls. Though most of the avatar choices are rather gender-neutral, girls seem to gravitate toward the very feminine dress style, and to a lesser degree the adventure style (which, with a cape and belt, may also be interpreted as a female costume). This pattern mirrors the problem in the commercial video game world of females being depicted in limited and stereotyped ways. By providing mostly gender-neutral clothing styles, we may be offering girls too few appealing choices for self-representation (Bruckman, 1998; Donath, 1998; Turkle, 1994). Further, when so many girls choose the same clothing style, their presence in the virtual space

begins to appear homogenous. As one researcher put it, girls are "running into themselves all over." Discovering how this may effect girls' perception of themselves and of female involvement in QA will require further research.

Homepages. Each Quester also has a personal homepage that is displayed when another user clicks on the individual's avatar or clicks the sender's name of a QA email. The amount of information on one's page, including information about their likes, interests, talents, and possible future careers, is determined entirely by the individual. Girls (M = 82 characters) tended to write significantly more information on their personal homepages than did boys (M = 55) (t(3340) = 6.50, p < .01). This finding suggests that girls are more willing and invested in putting information on their homepages for others to read (or, another interpretation, are simply more likely to complete what they interpret as "assignments" even if the degree of completion is optional). Qualitative analysis also reveals that girls tend to present more information regarding hobbies and interests than do boys.

Name Plaques and Jobs. Another category of identity presentation involves leaving personal traces in the virtual environment that others can see regardless of whether the individual is currently logged on. First, once students complete more than two Quests, they can apply to the Council, describing how they have contributed to the Council's mission and, if approved, get their name posted on a plaque on a virtual wall. This activity produced equal interest, with 41 girls and 39 boys applying to have their names on the wall and indicating no significant differences between genders. On a related note, at the time of this writing, students can apply for QA helper positions, including greeter, tour guide, and chat monitor. These jobs had been active for only a month, but already, 50 girls and 69 boys had signed up, with no significant different among genders; as with placing one's name on the wall, this feature seems to be compelling to both boys and girls.

IV. Collaborative Participation Affordances

Collaborative Roles. An illuminating form of collaboration occurs when one child with more knowledge or experience helps another child in QA, through orienting, supporting, or assisting them. These scaffolding and apprenticeship activities have been observed throughout the duration of the project. Even when QA was in its formative stages, implemented only at an after-school youth club alongside other computer games, we witnessed children helping each other to a remarkable extent, for altruistic reasons, for the joy of collaboration, and for the cachet that expertise brought. For example, one child wanting to join others in the virtual space was helped by a friend: "You and him are chatting together. I wanna be there." He called for a staff member to figure out how—"I need help getting to…"—and his friend showed him, physically sharing the chair and appropriating the mouse.

As the program structures—and calls for support—grew more extensive, children helping each other became a cultural norm. As mentioned earlier, children

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with "jobs" in the virtual space submit reports on their experiences. In this report, a child demonstrates how his work as a greeter contributed substantially to the experiences of others, suggesting that his helping was its own reward:

> Then I greeted adejau0. He asked me to show him around the worlds, so I did. He told me I was a great friend. The next person I greeted was alexechr0. He asked me to tell him how to build. Now, thanks to me, he has a beautiful house in Qville. Then I greeted kirklau0. She said that it was a wonderful start to her time on Quest Atlantis. The last person I greeted was my friend zcorrKR, who is no longer doing Quest Atlantis. Because of that greeting, we became good friends.

Though sometimes these represent fairly simplistic collaborations, such as helping another navigate in the virtual environment, at other times they even rise to collaborative work on the academic Quests. This latter type of collaborative work began with children helping each other in parallel as they worked individually on the same Quest. Given the power of this type of collaborative work, this ability was eventually instantiated into a design affordance where Questers could submit collaborative work yet each be responsible for their own reflections on their individual contributions and experience. Whether in the physical space of the computer lab or the virtual space of the OTAK, children engage in scaffolding and apprenticeship activities that contribute significantly to the experiences of all participants and, indeed, to the ethos or cultural norms of the program.

Guilds. Another play structure of interest is Guilds: Questers can join a group in which they have a common mission and thus share percentages of points earned with fellow group members. Over the past year, the Guilds were active for only two months. However, in that period 112 boys and 91 girls signed up to join a Guild ($X^2(1) = 1.08$, $p > .05$ (again, no difference between genders). One aspect of these Guilds is that participants can break allegiance with one Guild and join a different one. While there are no significant differences in terms of the number of Questers who signed up for Guilds, there are significant differences in terms of "Guild disloyalty." Of the Questers who have signed up for a Guild, 63 boys have broken from one Guild to join another and only 24 girls have done so, indicating that boys are more than twice as likely to break their affiliation with a Guild ($X^2(1) = 12.75$, $p < .01$). One could treat this data as an example either of boys being more active or of a potential on their part to be disloyal. Clearly, member checking is necessary before any assertions can be advanced. In terms of Guild choices, girls were most likely to choose the Culture Guild with its focus on expressions of culture while boys chose the Ecology Guild with its focus on environmental issues.

V. Communication Affordances

The primary means of communication within QA is verbal discourse, usually typed on a keyboard and then read as text on another computer screen. Questers can

communicate synchronously through chat and telegrams, and asynchronously through email and bulletin boards, all of which have their unique norms, and each of which engenders a different form of communication (Herring, 2004). Moreover, all of these forms of communication are used actively and extensively. Public chat consists of short messages sent by one participant to all other participants within "hearing range" of the sender, and in the first 15 months of the program, children typed almost 500,000 lines of chat. In general, girls tended to post almost twice as many chat messages as boys.

The QA email system supports longer messages consisting of multiple lines and quoting of previous messages, and supporting multiple recipients. No one outside the QA program can send or receive email within the system, and Questers cannot send emails to people outside of their local classroom or affiliation unless they first meet this person in the virtual space and add their username to their "Friends" list. In the first 15 months, children sent almost 1,500 emails with boys being almost twice as likely to send an email than girls. Telegrams are short private messages sent from one sender to typically a single recipient, and bulletin boards, like traditional online forums, support threaded conversations and entail topics initiated by both teachers and researchers. Girls tended to send more telegrams and make more posts than do boys.

Example of Chat. Beginning with chat, we first look at three conversations from a randomly-selected day to illuminate the types of interactions that occurred and the extent that these are gendered. To reiterate, although the day was randomly selected, it is not necessarily representative of the chat in general. Still, this dialogue does provide a window into the types of chat interactions that occur. Identifying sender-recipient relationships for public chat is more difficult than identifying the relationships for mail or telegrams, as done below. Unlike mail or telegrams, chat messages do not have an explicit address that identifies the recipient. Therefore, we inferred these relationships by looking for topical cohesion between messages and explicit addressing by the participant to the sender (Panyametheekul & Herring, 2003). These relationships were processed by the software programs Ucinet and Krackplot (Borgatti, Everett, & Freeman, 1999) to build the network map shown in Figure 3.
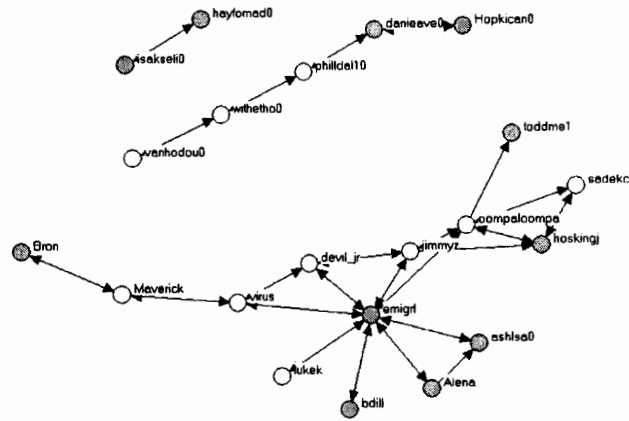
*Figure 3. Network map showing sender–receiver chat relationships,
with girls being represented as the darker nodes*

In Figure 3, the conversational ties between after-school and late-night participants are displayed at the bottom of the figure. Two different types of conversations tended to dominate the discussion on this day. With respect to the first type, Emigrl (a U.S. girl) and Oompaloompa (an Australian boy) occupy central locations in the network due to the long period of time they spent online that day. As other participants dropped out of the space and new participants logged in, Emigrl and Oompaloompa were able to establish new conversational connections. Both male and female participants in QA can develop central positions within the QA social network by participating in the MUVE after school and actively engaging other participants in conversation. The cluster of nodes at the top of the diagram reflects the second type of conversation, in which an entire classroom logs in at the same time. Here, there are relatively limited chat connections among participants, usually because the teacher has an explicit goal for students in the virtual environment.

Example of Email. QA email postings tend to be longer in length and more substantive in content than the chat. The topics range from the building of friendships, to talking with the Council, to conversations among groups of Questers on a common topic. An example of students vying for social status among other classmates can be seen in the following thread. It is important to note, similar to other observations of the chat space, that neither the boy nor girl necessarily has more power than the other; instead the issue is socially-negotiated at the level of the interaction—not pre-determined by one's gender. In this interaction, one boy Quester, referring to the virtual hotel built by a girl classmate, stated,

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Come one come all its Lisa's hotel and you wouldn't want to miss a spot in this totally awsome hotel. there is going to be a pool at least two floors at most I don't even know the answer to that question. If you guys and girls want a spot you better hurry.
P.S. You guys'll love it :)

Another boy student responded,

Dont go to Lisa's Hotel it stinks!!!!!

Defending her friend, another girl responded,

YOU HAVE TO GO THERE IT WILL BE AWSOME !!!!!!!!

Trying to get people to visit the hotel he and his friend built together, a boy responded to the thread,

My hotel rocks book a room in it now for freee you get whatever you want in it. Whatever you do dont go to Lisa's hotel.

Another boy, being a little more diplomatic, stated,

Mike is right you can book a room for nothing at my [our] hotel 2. But come 2 both hotels [referring to his and Lisa's].

Questers also use telegrams to communicate. Telegrams were usually abbreviated messages, a little longer than chat posts but shorter than emails. They also tended to be one-to-one in that the system requires them to be directed to a particular receiver. While power differences do emerge among Questers, in terms of email, telegrams, and even chat, power differences tended not to be defined along gendered lines. Nonetheless, girls did tend to use all of these communication structures significantly more than boys, as illuminated in the quantitative analyses below.

V. Reflexivity Structures

Metacognition. Another measure of student's success is the degree to which participants are able to think metacognitively about their work (Perfect & Schwartz, 2002). Within QA, students submit their work online on a response page which includes two parts: 1) the response to the Quest, and 2) a reflection on their response. The reflection is prompted and guided by the following three questions:

1. How does your response meet all the goals of the Quest?
2. What did you learn about the topic and yourself from doing this Quest?
3. Tell the Council how your response helps the mission of QA.

We designed a study to measure specifically the quality, depth, and qualitative trends of Questers' metacognitive responses to these reflection questions. Student reflection responses were gathered from 5 different Quests and were rated on a 5-point rubric with a .93 inter-rater agreement. The rubric was based on

completeness, relevancy, number of reflections, and depth and complexity of reflection. A typical score of 1 would be minimally complete with only a single attempt to reflect. A score of 5 would address all 3 reflection questions at a level of metacognitive depth that is notable and that indicates that students are truly reflecting on how their work is connected to a deeper issue or broader context.

While both boys' and girls' reflection performance was found at the top and bottom of the rubric scale, girls ($M = 2.88$) scored significantly higher on measures of metacognition than did boys ($M = 1.90$) ($t(93) = 4.23, p < .05$). Girls' reflections typically demonstrated greater numbers and depth of metacognition. The difference between the two groups equates to an entire point on the rubric scale, which corresponds to one standard deviation. In addition, girls on average wrote longer, more detailed reflections, going beyond the minimum typically required for a Quest. Boys were more likely to leave the reflection section completely blank (10%, compared to girls at 5%).

In a review of the content of boys' and girls' reflections, qualitative differences between the two groups were evident. For example, in one Quest about societal problems, many boys' reflections focused on solving the problems. One boy's reflection on what he had learned (question 2) read,

> I learned that I hate smoking and I can make a good argument against it. Atlantis should have non-smoking laws too because smoking is harmful to everyone.

Certain social issues were too difficult to resolve, and in fact, many boys wrote that these things must be accepted. For example, one boy wrote the following answer to question 2:

> What I learned is that some things in life just can't be changed. With that I learned that some things can be changed, which reminds me of something; Don't cry over spilt milk.

Girls on the other hand spoke less of problem solving and more of relating to the individuals involved, and girls wrote that they share similar problems and that the girls in the story were fortunate in comparison to others. For example, one girl responded to question 2 as follows:

> When I did this Quest, I learned that Atlantians also had a lot of bummers too. I was sort of under the impression that Atlantians live in the perfect world. Now I know that the Atlantians are a lot like us. By doing quests I learn more and more that Atlantians are like us.

A girl who did mention solving problems did so within the context of talking about other people, not just solving the problem at hand. Her response to question 2 read,

> When I was writing this quest I learned how important it is to help others, how much my family did to help others, and it made me realize how many things you can do to lend a hand with things in the community.

In sum, the boys and girls not only showed significant quantitative differences in their metacognitive performance, they also show qualitatively different foci within their reflections.

Transactive Interactions.   Here, we present an extended case study of one student to show how, through participation in QA, she came to better understand her own behavior while at the same time transforming the Quest Atlantis context. Mary, an eleven-year-old child attending elementary school in a suburban Midwestern town, was considered somewhat of a "trouble maker" by the teacher and had consistently lower grades than her classmates. Still, she was outgoing and had two or three girlfriends who were considered popular in the class. Mary first came to our attention when another teacher reported that she was bullying a student in her class. More specifically, Mary had learned that she could get more QA points by finding someone else to sign up for her Guild and having them choose her as mentor. Below is an excerpt of the reported incident.

Mary: sadie just please do what i say
Sadie: but i just dont know
Amy: PLEASE!!!!!!!!!!!!!!!!!!!!
Mary: listen to what i am saying
Mary: PLEASE JUST LISTEN TO ME
Amy: PLEASE LISTEN TO HER!!!!!!!!!!!!!!
Sadie: i dont want to do it!!!!!!!!!!!!!!
Mary: WHY
Sadie: im trying to work on a quest
Mary: okay then bye
Mary: letas go amee
Sadie: r u leaving
Sadie: fine bye
Mary: yeah cuz ur not going to do it. if u do then for a mentor highlight my name

Following this incident, the mother of the bullied student, Sadie, called Mary at home and told her how inappropriate her behavior was, and Mary began to cry, claiming that she did not mean anything by her behavior.

The next day, the teacher pulled the class aside and told them that two students (Mary and Amy) were banned from QA because of their bullying behavior. In response to this incident, their class created a list of rules that later became known as I-BURST, an acronym representing particular forms of appropriate behavior. Though designed specifically for this class, the list was adopted by another classroom in the school, and a suggestion was even sent to the QA project team to implement the rules more widely. Following this suggestion, the I-BURST rules were posted in the 3D environment and began to establish a norm for behavior: for example, responding to some bad language, one student typed in the chat space, "QA is not supposed to be used for swearing.... Please review the I BURST chat rules."

Further, Mary herself was given the opportunity to rejoin QA. Told that she could serve "community service" hours to earn her way back, Mary became a "greeter" in the virtual space, helping to make others feel welcome, and sometimes serving as a "monitor," correcting them for using inappropriate language. After writing an apology, working as a greeter and monitor, and demonstrating a positive change in behavior, Mary became a role model in both the virtual world and her real-world classroom, where she was repeatedly referred to as the class leader in QA. For example, she was the first student in the class to earn enough points to purchase land, and she even built rooms for many of her friends and for an Australian girl who did not have enough funds to purchase land for herself. Mary also completed a number of academic Quests of her own volition. Demonstrating her pride in this transformation, when we visited her classroom, Mary told us how her house had evolved, and she proudly mentioned that her name was displayed on the wall. She discussed her contributions to her Guild and even printed out exciting chats and emails representing her online participation. Mary's transformation was plainly evident. Indeed, her teacher commented, "I even see changes in the classroom, where she is so much more helpful to other students," and, in an interview, Mary herself stated, "I think I have changed in that I am a lot more helpful both in QA and out. I really try to correct others when they don't use the rules." Significantly, these "rules" are the I-BURST rules that her own behavior stimulated and that she in fact helped to create.

We share this as an illustration of the transactions among the QA structures and individual members, with each affecting and being affected by the other. At other times, the impact was not so dramatic: for example, a Quester might simply post some text or greet another Quester. Still, because all participation—and even one's online identity—are reified into data, Questers can reflect on their participation and their individual trajectories in ways that allow them to evolve their online identity, shaping these personae and their participation in ways that align with that which they want to portray.

CONCLUSIONS

Given the fact that videogames engage users in rich (discursive, problem solving, inquiry, and collaborative) practices, that early videogame experience has been linked to greater comfort in using computers, that videogames represent one of the principal "storytellers" for children in the 21st century, that the content of these games is usually determined by commercial developers, and that videogames seems to be quite successfully engaging youth, we have suggested that it is a societal imperative to understand how to design games that engage all children. More generally, we know little about what a game would look like that would engage children in social commitments and academic content learning. At a minimum, we believe it involves fostering the same elements of motivation that game developers integrate into their designs and that have been discussed in the previous academic literature on motivation: challenge, curiosity, fantasy, control, and social interaction. However, we have also argued that it requires the design of

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a larger context of participation, one that involves going beyond the technological innovation itself to consider the larger context in which the innovation is situated and through which it takes on meaning. In our case, this involved developing a character-oriented narrative that included male and female protagonists, establishing structures that fostered friendship and social interaction, using bright, colorful visuals that contributed to immersion and engagement, adding interactive rule sets, and drawing on the complex set of motivational elements discussed above.

Overall, we have gathered much evidence that we have developed a socially-responsive game that is being successfully enlisted in the context of schools. Given our commitment to social responsivity, we were also interested in whether the designed space would prove motivating for both genders. We examined various structures of QA, and the data suggest that across the diversity of media, including those that rely on technology, girls and boys both engaged with QA. The identification of structures children found to be resonant, as well as their responses to these structures, suggest generalizations that may be useful to designers of virtual communities.

Both genders expressed enjoying fantasy settings: for girls, it was a fantastic natural scene, and for boys, a fantasy that harbors adventure, but the shared appreciation of other-worldly settings suggests the feasibility of designing virtual spaces inclusive of both genders. While the social, symbolic, and locally-customizable structures of the QA experience afforded many opportunities for gendered identification (e.g., avatar choices), performance (e.g., Quests), and interaction (e.g., email), we are heartened by the results found, ones that illuminate not simply gender differences but gender-specific benefits. For example, in some moments, contextualization in QA seems to have inspired more substantial engagement in academic tasks for boys than usual. In other moments, we see girls taking on substantial roles as community/communication leaders—across genders—in a complex, technological environment. This gender story reflects not the erasure of gender but, rather, a tempering of some conditions that often differentially support or limit the technological, social, and academic engagement of boys and girls. In fact, we saw numerous instances where girls were in positions of power, where they were the technological leaders of the class, and where they were considered the experts of the game.

While a more comprehensive ethnographic analysis is necessary to make substantial assertions, our analyses here lead us to believe that, in the context of QA, both boys and girls found legitimate avenues of participation, and, more importantly, neither gender appear to dominate the space. Instead, power seems to be based on the centrality of the individual to the community, with some structures favoring girls and others favoring boys, but with agency and voice being available to both. Issues of power are especially important in that they ultimately facilitate and legitimize use and ownership of particular structures. The more we are able to create technology-rich contexts of participation that help girls regard technology as supporting things that they value and spaces that they control, the greater

opportunity we have of making technological spaces and participation become non-gendered.

We observed that the engagement of children lies in no small part to the resources, structures, and overall aesthetic that contributes to the QA context of participation. The network relies on various project resources—the movie-style posters, the novella and comic book, the trading cards and stickers, and other project resources—all of which portray girls and boys in positions of equal importance. Further, in developing these resources, we have worked to ensure that the storylines featuring Earth children and the Atlantis Council honor boys and girls equally. Coupled with these non-gendered or similarly gendered resources are a myriad of structures that appear to be compelling, although sometimes somewhat differently, to both boys and girls. Further, as highlighted in this manuscript, we have developed various participation structures, including those that support learning and achievement, identity development, narrative engagement, communication, collaborative participation, and reflexivity. With all that in place, we still monitor, participate in, and revise the community spaces, continually working to ensure that both genders may find equivalent agency and voice.

In reflecting on our development and those aspects highlighted in this chapter, we have highlighted six affordances that were central to our understanding of user participation. Specifically, these include tools, resources, and structures that afford learning and achievement, identity development, narrative engagement, communication, collaborative participation, and reflexivity (see figure 4). *Rather than representing individual elements, these affordances were considered transactive, collectively constituting the aesthetic and resultant ethos that is Quest Atlantis.* This aesthetic was strongly influenced by our particular commitments and assumptions, especially as they involve education and social responsivity. For example, rather than developing a backstory that involved killing fictitious creatures, the QA narrative centered on establishing empathy for the people of Atlantis, using this empathetic understanding to examine problems on Earth, and evolving one's character through sharing and reflecting on real-world accomplishments. For others interested in doing socially-responsive design work, we urge them to focus not simply on the technical structures and tools employed but also on the collective ethos that these resources are intended to engender.

We refer to this collective ethos and the various structures and affordances through which it is implemented as the *context of participation*. It is through this context of participation that meanings are made, and it is this larger context that is too often neglected in conversations by educators about technology. It is also important to note that these affordances, our particular aesthetics, and the emergent ethos, while influenced by us, also transacted with those who use the space. For example, we witnessed the emergence of norms, values, and even reified structures such as in the case of the I-BURST rules, all based on choices that participants made. While technical structures might be less impacted by users' actions than were formal or informal norms and rules, even those come to be impacted by user participation. In the gaming world, both sides of the spectrum exist, with some games having a very top-down structure that is pre-defined by the designers, and

others having low levels of pre-designed space, with much of the game play being established by the players themselves.
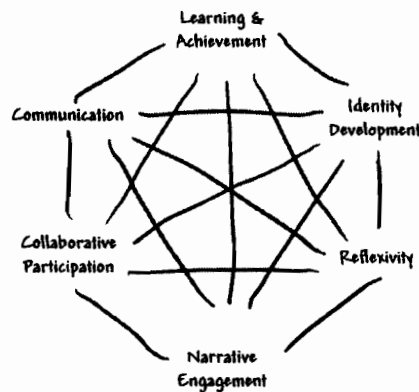

Figure 4. Design structures affording user participation in the Quest Atlantis context

While much of a product's ethos emerges over time, one should not underestimate the role of aesthetics in informing the larger context of participation that is established. In other words, it is important to consider the packaging used to "market" the collective ethos of the space. Games that feature dark settings, incorporate violent themes, and objectify women, are likely to alienate girls from these early experiences with technology. Consider, for example, the success The Sims has had in engaging girls: we consider this in no small measure as due to its look and feel as well as its type of game play. To the extent that early experiences impact later life choices, as many have argued they do, we believe that educators have a responsibility to develop technological play spaces that welcome all children. This study highlights those features used in video games as offering a significant space for participation, at the same time demonstrating that it is possible to enlist this medium in academically and socially responsive ways. Our experience supports the value of the underlying goal of our work to bring together education, entertainment, and social commitment.

IMPLICATIONS

While few would deny that video games have captured the interests of today's children and adolescents, many would argue against the positive value of the interactions that occur in these games for the children who play them. In contrast, many current games researchers view video games as quite sophisticated, offering a play space for rich discourse, engaged problem solving, cooperative problem

solving, collaborative inquiry, and opportunities for consequentiality and the exploration of situated identities (Gee, 2003; Steinkuehler, 2003; Squire, 2004). We have further suggested that video games are significant spaces that bear a rich potential in education, not only in teaching such content as history and geography or such skills as navigation or resource management, but also in accommodating and even fostering players' reflection on their game playing. When such reflection connects the gameplay with a player's real life, and when the reflection achieves such a pitch as to build upon itself, then it can achieve a critical or transformative effect, giving the player a new perspective on the game, on real life, and on the role of identity in bringing the two together.

Our work indicates that through the enlistment of a game-based context (i.e., a context entailing a narrative history, a setting with affordances and imperatives, and role-play identities that give rise to player participation), we were able to successfully engage players in critical reflection in terms of academic content and pro-social issues. Still, even in video games with such a rich backstory, the backstory serves to frame the gameplay; it need not be salient and perhaps should not relate to a player's real world to be commercially successful. Indeed, two compelling features of games are that they are transgressive and they are not real. Even among games with backstories analogously or metaphorically relevant to players' real lives, many players may not make the connection to their lives, so the potential of the game to support a player's reflection on its significance may not be realized.

Relevant and hence potentially transformative structures are not likely to figure centrally among the developers' concerns, so the employment of the structures to purposively occasion critical reflection are not likely to occur. For many players, a game must positively structure such reflection for the critical degree to be achieved. In our work, we have undertaken a design trajectory that conscientiously involves the development of an educational game with an explicit pro-social agenda. We have worked to develop the context of participation such that players are indeed compelled, if not required, to critically reflect on their participation and the world around them. In terms of next steps, we are currently integrating other methods used by game designers to engage players. For example, one current emphasis is on integrating extended trajectories of participation (affordance networks) in which the game play moves beyond the completion of linked Quests, and also involves *game-based missions*.

These game-based missions involve unfolding storylines in which plots are established, critical decision points are engaged, and opportunities to apply academic concepts to particular narratives are encountered. For example, developing a virtual park in which students interact with game characters, investigate various water quality problems, and use their emergent understandings of, for example, the process of eutrophication to analyze a water quality problem and propose a solution (Barab, Sadler, Heiselt, Hickey, & Zuiker, in press). Choices, such as suggesting the closing of the logging operation, might have initial environmental benefits, but also have negative consequences for the economic longevity of the park; thereby positioning the player in a storyline in which they

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are protagonist in determining how the story unfolds. The important point, in relation to this chapter, is the acknowledgement that digital video games provide an important experiential space for supporting meaningful learning, and that it might behove educators to understand and leverage this powerful medium. In this chapter we have demonstrated its utility for supporting academic learning in the context of schools, and for engaging players in significant issues upon which they are adopting and advocating pro-social stances.

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Sasha Barab
Learning Sciences
Indiana University

Tyler Dodge
Instructional Systems Technology
Indiana University

Hakan Tuzun
Instructional Technology
University of Turkey

Kirk Job-Sluder
Instructional Systems Technology
Indiana University

Craig Jackson
Quest Atlantis Project/Design Manager
Indiana University

Anna Arici
Cognitive Psychology & Educational Psychology
Indiana University

Laura Job Sluder
Instructional Systems Technology
Indiana University

Robert Carteaux Jr.
Instructional Systems Technology
Indiana University

Jo Gilbertson
Teacher Research Associate
Indiana University

Conan Heiselt
Instructional Systems Technology
Indiana University