

---

# Worlding through Play

## Alternate Reality Games, Large-Scale Learning, and *The Source*

●

PATRICK JAGODA, MELISSA GILLIAM,  
PETER McDONALD, AND CHRISTOPHER RUSSELL

Gamification—the use of game mechanics in conventionally nongame activities—has received attention in the field of education. Games, however, are not reducible to the common mechanisms of gamification that target extrinsic motivation, and may also include elements such as role playing, world making, and collective storytelling. Here, the authors discuss the potential learning benefits of large-scale and situated alternate reality games (ARGs) that complicate conventional gamified systems. They also explore the scaling up of improvisational modes of play in these games from intimate groups to large collectives exceeding the size of typical classrooms. They use a case study of *The Source* (2013), an ARG they designed (with funding from the National Science Foundation) for urban youth of color from the South Side of Chicago in an out-of-school setting using play across several platforms. *The Source* aimed to promote the academic areas of STEM (science, technology, engineering, and mathematics), as well as twenty-first-century literacies and social justice. The authors argue that such ARGs facilitate learning by engaging semifictional and immersive play made flexible and extensible through game forms. They suggest that, although designers determine the challenges in an ARG, the players shape the experience and shared game world through collaborative actions. **Key words:** alternate reality games; gamification; scaling; teaching STEM (science, technology, engineering, and mathematics); twenty-first-century literacy; worlding through play

### Introduction: Gaming the Present

**I**N THE EARLY TWENTY-FIRST CENTURY, our world is very much in play. Games, in particular, have become a prominent metaphor for and material reality of everyday life. Game structures and themes permeate American culture. Popular novels, films, and television series such as *The Hunger Games*, *Ender's Game*, and *Game of Thrones* highlight how central games of competition and chance

are to contemporary society. Reality television shows entangle participants with game rules and objectives. Professional and college sports saturate leisure time and inspire passions. Video games and ludic virtual worlds engage millions of players, and the commercial game world has experienced faster growth in recent years than either the film industry or music business (Wilkofsky Gruen Associates 2012). Outside entertainment and cultural experiences, we encounter military training simulations, national election contests, and the stock market betting of global finance that influence our political and economic lives. Games, then, in a variety of ways, serve as a form for encountering, processing, and testing the present.

In recent years, the phenomenon of *gamification*—the use of game mechanics in traditionally nongame activities—has come to influence areas as diverse as business, personal leisure, and social life (Groh 2012; Jagoda 2013). Gamification seems particularly widespread in education. There has been a recent proliferation of gamified apps, educational games, and digital media and learning interventions, but historically education has also included sensory-motor and symbolic play, as well as rule-based games.

John Dewey, as early as his influential 1916 book *Democracy and Education*, argued that play and games need not be treated merely as “relief from the tedium and strain of ‘regular’ school work” (228). Instead of a diversion, play can become “a part of the regular school program,” one that engages the “whole pupil,” reduces “the artificial gap between life in school and out,” increases “attention” to educational materials, and promotes “cooperative associations” in “a social setting” (228–29). Dewey’s celebration of games belongs to a broader discourse surrounding play that Brian Sutton-Smith (1997) calls the “rhetoric of play as progress” (9). This understanding of play derives from eighteenth-century notions of human progress that grew into extensive theories of child development (Isaacs 1929; Piaget 1965; Sutton-Smith 1967; Vygotsky 1978).

Forms of educationally oriented play proliferated during the late nineteenth and early twentieth centuries, including innovative play-centric programs such as the kindergarten. This period also saw the rise of out-of-school activities such as outdoor games organized by the Boy Scouts and Girls Scouts of America in the Progressive era, as well as the trail-based game “podchody” played by Polish scouts called *harczerze* (Urban and Wagoner 2009; Montola, Stenros, and Waern 2009). Since that time, psychology and educational scholarship have treated play as a mode that enables adaptation, socialization, learning, and growth. The spread of multimedia platforms in the late twentieth century has also led

researchers to think more expansively about the ways that interactive experiences, including game play, can influence cognition, affect, instruction, and fundamental understandings of literacy (Bawden and Robinson 2002; Livingstone 2002; Thomas and Brown 2011).

Regrettably, throughout the first two decades of the twenty-first century, national policy has increasingly compromised play in educational settings by emphasizing standardized academic outcomes. At the same time, opportunities to incorporate play into learning have increased, especially with the emergence of a new media ecology dominated by console, browser-based, and mobile games. Serving as a countercurrent to mainstream public education, games continue to have a strong relationship to education and to spur ongoing research about ludic learning (Young et al. 2012).

James Paul Gee (2007), an advocate of game-based education, contends that all learning amounts to a process of understanding a set of methods, rules, and values—that is, “learning to play ‘the game’” (7). Building on this insight, institutions such as the New York City Quest to Learn school use game-based curricula. Similarly, nonprofit organizations such as Games for Change facilitate the design and spread of “serious games” that exceed entertainment in favor of social, political, and educational contributions. Game designers Katie Salen (2007) and Eric Zimmerman (2009) have even proposed the umbrella concept of “gaming literacy” to supplement both traditional literacy (the ability to read and write) and media literacy (the ability to analyze and create images, music, and other media). The process of playing and creating games, they argue, can help people make sense of contemporary systems, emergent forms of play, rule structures, and social dynamics.

If we think metaphorically about play and games, we could call school itself a large-scale game. School, like a game, includes a set of rules, artificial conflicts, objectives, differential outcomes, and a self-contained time and space. But what is at stake in calling school a game? A “game,” after all, could be used to emphasize particular aspects of play and to produce a varied range of curricula. Again, one way that the metaphor of games tracks through educational contexts is via gamification and gamified systems that depend on points, achievements, levels, and leader boards. Gamified education privileges competition and favors extrinsic motivation. But games are not reducible to the mechanisms of gamification, insofar as they may also include elements such as role playing, world making, and collective storytelling that are minimized in or excluded from gamified systems. In this second sense, games operate as a very different

metaphor that privileges play, improvisation, social interaction, and intrinsic motivation. As some researchers have suggested, we might do well to imagine games not as targeted or instrumental interventions that serve as information delivery mechanisms, but as occasions for situated learning that unfold amid social interactions and emergent cultures (Gee 2004; Pelletier 2009).

This article enters the robust conversation about play, games, and education by exploring two related matters: the potential benefits of large-scale and situated alternate reality games (ARGs) and the challenges of scaling play processes (which cannot be standardized) for learning. We approach these topics through the case study of *The Source* (2013), an ARG that we designed to promote STEM academic areas, twenty-first-century literacies, and an awareness of social-justice issues to young people in an out-of-school setting on the South Side of Chicago. This ARG unfolded through five weeks of game play organized by a transmedia narrative—a single story that moves across and layers numerous media platforms and cultural forms.

Large-scale games, such as *The Source*, raise a series of questions: Is it possible to scale up improvisational modes of play from intimate groups to large collectives that exceed the size of a traditional classroom? Moreover, can such games serve as models for increasing the scope of a situated learning paradigm that facilitates the type of collaboration, responsiveness, and flexibility that might help youth better negotiate a contemporary environment saturated by digital media? Finally, and fundamentally, how does one scale up play? On its surface, the two key terms in this last question may appear to be at odds. The process of *scaling* an educational intervention reflects an industrial-era ambition for standardization, replication, and uniform distribution. The concept of *play*, on the other hand, with its qualities of improvisation, relationality, and world creation, belongs to a different postindustrial era (Davidson 2011). Nevertheless, in experimenting with education through forms of gaming literacy, it is critical that we think through this seeming paradox.

We contend that it is possible to take a bottom-up play relation established through interactions between players in a small setting (rather than through the top-down rules and objectives of a game) and either reproduce it on a larger scale or transfer it to other sites. To foreground the dynamic aspects of this process, we formulate the concept of *worlding through play*, which describes the means by which collaborative play among adults and youth might transform educational structures through game metaphors. This relational approach stands in contrast to a model that requires teachers or designers to impose largely intransigent curricula on students. School, we contend, may be imagined as a

generative game, but the application of the metaphor has to come from within the mode of play itself. The specific cultural form we find most promising in allowing us to experiment with this process is the transmedia storytelling and game genre of the ARG. We offer an overview of this form followed by a case study of *The Source*. The design and implementation of this educational game offers insight into how ARGs, which often work well in small case studies, might be constructed for larger numbers of players.

### Alternate Reality Games

Although our case study, *The Source*, drew inspiration from and included original board games, party games, and outdoor games, the ARG form itself synthesized our different media into a coherent experience. ARGs are games that engage in transmedia storytelling (Jenkins 2006). They commonly use the real world as a storytelling platform and distribute clues, puzzles, narrative revelations, and opportunities for play across everyday situations and technologies (Stewart 2006; Kim et al. 2009). Players might need to find a cassette tape in a library, hack an obscure website, or pick up a ringing payphone at the right time. Montola, Stenros, and Waern (2009) argue that ARGs should be considered a form of pervasive play not limited to the common “magic circle” that establishes a bounded time and space for game play. ARGs encourage a permeability of the spatial, temporal, and social boundaries in which we ordinarily play through their unique this-is-not-a-game aesthetic used by designers to suggest to players that the shared experience is not a ludic fiction the designers created but rather an extension of the real world (McGonigal 2003).

*The Source* broke down boundaries, leading participants to numerous online locations, across a university campus, and out into sites around Chicago. From the beginning, players received emails and videos from the main character Adia, a seventeen-year-old girl who recruited participants to join the game. By the end, in the midst of scavenger hunts, some participants suspected even casual bystanders on campus of being secretly involved in the game. By extending the playing field, spatially and temporally, ARGs also change the social relations among players to engender networked forms of competition, cooperation, and role playing. In an ARG, no single player can experience every event, solve each puzzle, or know every narrative detail. This constraint encourages players to take ownership of aspects of the game. Another unique strength of

the form is the capacity of designers to respond to player contributions in real time to foster collective interplay.

Early ARGs primarily took the form of entertainment and marketing devices with games like *The Beast* (2001), *I Love Bees* (2004), and *Last Call Poker* (2005). Since these early games, however, the canon of ARGs with educational components and sociopolitical topics has grown to include games such as *World Without Oil* (2007), *Black Cloud* (2008), *Evoke* (2010), *Project Velius* (2011), *Arcane Gallery of Gadgetry* (2011), and, from 2012, *Speculation* (Niemayer 2009; Battles, Glenn, and Shedd 2011; Bonsignore et al. 2012a; Hayles, Jagoda, and LeMieux 2014). Preliminary research has suggested that ARGs might be a useful platform for motivating collaborative learning and teaching twenty-first-century literacies that include cognitive, intrapersonal, and interpersonal capacities (Hainey et al. 2011; Bonsignore et al. 2012b).

Though board games and video games may carry various learning benefits, ARGs have unique educational affordances linked to their transmedia and improvisational dimensions. ARGs encourage what we call worlding through play. Worlding, here, stands in contrast to the world as a stable object (Wilson 2007; Kaiser 2012). It marks a process of constructing a world and undertaking shared projects within that space and time—a process that responds improvisationally to the situations of all participants (whether designers or players) and perpetually seeks to make playful actions possible. We then use worlding through play to describe the creation of a semifictional structure made flexible and extensible through the ARG form.

Although a massively multiplayer-online game such as *World of Warcraft* gives players access to a predesigned environment, an ARG offers them the potential (albeit one that is not always realized) to expand the shared game world and its rules. Even if the designers determine most of the challenges in an ARG, the this-is-not-a-game aesthetic ensures that the players, not the developers, negotiate the meaning of the experience and determine its status as either a game or an extension of reality. ARGs, we contend, carry potential for learning because they address players who collaborate with others to transform their world. These games do not, as do so many forms of gamification, invite consumers to solve puzzles and resolve a wholly prefabricated world.

To demonstrate concretely how ARGs use transmedia storytelling and game-based interplay to facilitate this form of worlding through play—and why this process is crucial for twenty-first-century learning about new media technologies and collaborative techniques—we now turn to the case of *The Source*.

In general, ARGs are designed for experienced gamers who are typically adults from privileged backgrounds. We designed *The Source* instead for urban youth of color.

### ***The Source: Design and Research Methods***

#### *Narrative and Game Overview*

The Game Changer Chicago Design Lab created and directed *The Source* ARG in 2013. This game used digital storytelling, games, and emerging new media forms to explore emotional health issues, social justice, and civic responsibility, primarily with urban youth of color. The lab enlisted university faculty, game designers, graduate and undergraduate students, high-school students, and community organizations. Participants came from fields that include new media studies, creative writing, art and design, and health and medicine.

*The Source*, which took several months to develop, was a feasibility study in the possibility of using ARGs for science, technology, engineering, and mathematics (STEM), as well as new media learning and twenty-first-century literacies. Creating a game with a long duration for several teams in the city of Chicago allowed us to begin thinking through the possibilities and advantages of scaling a transmedia game that might include greater numbers of players and unfold in several cities simultaneously. One of the major goals of *The Source*, then, was to use games and play to promote interest in STEM fields among urban youth of color. Though work in STEM areas is growing, many youth coming from disadvantaged and minority backgrounds do not see the relevance of these fields, which can seem to them overly abstract or culturally remote from their everyday realities (Hoffman and Llagas 2003; Bennett et al. 2004; *Expanding Underrepresented Minority Participation* 2011). The lack of diversity in STEM education yields representational imbalances, decreases job opportunities for members of underrepresented populations, and narrows possibilities for innovation (Davis et al. 1996). *The Source* used the players' familiarity with games to make the core STEM areas concrete and accessible.

The game play unfolded in five weeks—from July 8 to August 16, 2013—on the University of Chicago campus, at key sites in Chicago, and online. An urban realist narrative that we conveyed through multiple media connected the challenges of *The Source* to one another. The narrative introduced players to Adia, who lives on Chicago's South Side with her worry-prone mother and supportive



stepfather in a predominantly African American neighborhood. Late one night, Adia discovers a letter written by her biological father who disappeared when she was five years old. The letter reveals an intricate game that he created for her as his attempt to parent in absentia. Her father's game includes a series of challenges in STEM subjects, new media skills, and social-justice issues. Overwhelmed with work, Adia decides to invite others to help and crowd source the game, seeking willing players—namely the participants who signed up for *The Source* experience.

This narrative frame brought with it three major design benefits. First, it allowed designers to maintain the realism of the scenario and the this-is-not-a-game aesthetic by introducing players to Adia's world through the common social-media operation of crowd sourcing. Second, given the father's objective of teaching Adia a variety of lessons through his game, we were able to explain to players why the topical range of STEM challenges was so broad and to motivate the inclusion of each task by linking it to the father's biographical details. Third, the culturally specific narrative fostered improvisational interplay among the participants we recruited, most of them minority youths from the South Side of Chicago, by resonating with many of their own experiences.

The designers conveyed the fictional narrative of this ARG through multiple media: webisodes, social-media networks, blogs, text messages, voice mails, live performance, and more. We circulated the primary narrative content through eighteen webisodes (each between two and six minutes long) that included a cast of youth actors who played Adia, as well as her best friends Ros and Micah. Our decision to make videos the primary medium enabled some standardization of story delivery across all teams of players. The dissemination of the same videos to all participants (usually at the start of the day) allowed us to establish a shared foundation from which improvisation and forms of play tailored for particular teams could proceed, always returning to shared narrative points with each subsequent video.

Alongside these episodes, players could follow the daily lives of the characters via Facebook and Twitter. Additionally, the characters would post regular blog entries that filled in plot points and communicated challenges that players had to undertake. Players also received occasional personal text messages and voice mails directly from Adia.

By employing different media, designers created a distributed narrative that resisted uniform reception and changed as it responded to player contributions. Given the affordances of social media, this format allowed designers to play



back with youth in real time and to customize the experience for some of them.

Finally, in the concluding episode of the game, the three lead actors appeared on site for a live-action sequence in which players interacted with Adia, Ros, and Micah.

The narrative of *The Source* served to connect the topically divergent games and play activities created by Adia's father. These games took place in both online and offline spaces, ranging from screen-based text adventures to face-to-face simulations. While we assigned a predetermined theme for each week and designed most games in advance, the activities remained largely modular to enable substitutions and additions from week to week, depending on player performance. For example, in Week 3, the games focused on math and cryptography. The players began with an online tutorial that consisted of web pages with lessons about rebuses, anagrams, Caesar shifts, and Vigenère ciphers and culminated in a puzzle that yielded a collection of encrypted letters from Adia's father. Subsequent onsite challenges included a card game about encryption, encoded letters needed to unlock a serial narrative, and a mathematically oriented scavenger hunt that required players to investigate a cold case.

Shortly before Week 3 began, and based on the success of board games in the previous two weeks, designers created a new board game in which players had to break through layers of encryption at different hot spots. Games in subsequent weeks included role-playing exercises, text adventures, interactive narratives, video remixing challenges, outdoor simulations, and social-media challenges.

#### *Participants: Designers and Players*

Several designers—faculty, staff, and graduate and undergraduate lab fellows—contributed to web site and platform construction, social networking, game experience design, graphics, and video production. During the five-week execution of the game, the designers observed participating youth and responded to their play. The team committed to a form of real-time game design that entailed minor adjustments during game play and the addition of new material that took into account ongoing successes and failures of players.

A total of 144 young participants played the game (133 of whom consented to participate in the evaluation). These players ranged from ages thirteen to eighteen (with two-thirds falling between fourteen and fifteen years). We recruited the participants primarily from the surrounding communities, mostly on Chicago's South and West sides. The South Side of Chicago contains one

of the largest contiguous African American urban communities and some of the country's most racially segregated and city's most impoverished neighborhoods (Lindau et al. 2011; Logan and Stults 2011). Nine of the city's ten poorest communities are on the South Side. The players of our game were 74.2 percent African American and 12.9 percent Latino; 62.9 percent were male participants. Approximately 80 percent of the participants attended a Chicago public school and more than 60 percent were part of the free or reduced-cost lunch program.

In this game-based learning intervention, the demographics of the participants are particularly noteworthy, because most ARGs are not created with disadvantaged youth in mind. Shira Chess and Paul Booth (2013) contend that ARGs are "an ideal space to structure educational challenges and urge students to be creative and collaborative in the classroom" (3). While this assessment resonates with our own experience, we think it important to take into account additional differences among a range of students and classrooms. Most studies of ARG players focus either on players of promotional or entertainment-oriented games, like *The Beast* (2001) and *The Lost Experience* (2006). Of the subset of educational ARGs emerging from the serious games movement, most exist primarily for college students and seasoned players (Chess and Booth 2013; Stokes et al. 2013).

The intended audience is not incidental to designing and studying these games. ARG play for college students studying new media or computer science at research universities differs dramatically from that of urban students of color attending Chicago public schools. Games that prove successful for one group will not necessarily resonate for the other and may require tailoring to ensure that they are age and developmentally appropriate and culturally relevant.

Existing scholarship more often addresses the role of gender than that of race or socioeconomic status in ARGs. For instance, ARGs like *The Beast* and transmedia narratives like *Cathy's Book* targeted and attracted women (Dena 2008). However, few ARGs have successfully targeted racial or ethnic minorities or economically disadvantaged players.

The particular demographic group that played *The Source* demanded unique logistical considerations, including the acquisition of free bus passes, daily breakfasts and lunches, and a secure physical site for game play. It also required modifications to ARG conventions. For example, to achieve the this-is-not-a-game aesthetic, ARGs recruit players through scattered transmedia "rabbit holes" (a term adopted from Lewis Carroll's *Alice's Adventures in Wonderland* to describe the entry points into an ARG) that media-savvy publics and pervasive

game enthusiasts are more capable of recognizing. Since many of our players had limited technological backgrounds or had never before encountered an ARG, we had to be more directed in our recruitment, initially inviting participants to take part in a summer game, while still insisting subsequently on the reality of Adia's crowd sourcing request and her father's game.

### *Organization and Curriculum*

*The Source* was an out-of-school ARG that took place from Monday through Friday for five weeks. The out-of-school setting was especially significant for our predominantly African American players. As James Paul Gee (2007) observes, "It has been argued that some poor urban African American children and teenagers resist learning literacy in school because they see school-based literacy as 'white,' as associated with people who disregard them and others like them" (55).

The game play schedule required youth to participate in online challenges and transmedia narrative elements, from home, each Monday. Then, from Tuesday through Thursday, players came to the university campus for six hours a day to engage in games, activities, and exchanges with topic-specific experts. Finally, on Fridays, participants had the option of attending formal university workshops in which they could learn digital literacies, through skills such as web design and video production, and to use them to respond creatively to Adia's story.

At the beginning of the experience, we randomly assigned approximately ten players to a team. These teams competed for points that situated them on a cumulative leader board that documented their comparative scores on each day of the game. In one of our ARG's major innovations, we assigned undergraduate or graduate mentors to administer the daily activities and curriculum. Two mentors led each team. We selected mentors for their interests in a variety of relevant areas—education, game design, STEM, health, or urban policy. They guided participants through the daily challenges, shared personal stories and advice, and served as mediators between the game designers and players. The mentors operated simultaneously as game runners, teachers, and advisors.

Following extensive education research, we designed *The Source* to exploit the benefits of a game-based approach for situated and multimodal learning that responds to the media environment young people inhabit. Games involve players in interactive worlds and offer a context for addressing problems in a hands-on fashion. Games engage multiple learning styles through textual, visual, audio, tactile, and procedural means (Holland, Jenkins, and Squire 2003). They also gar-

ner player curiosity, motivation, effort, and optimism about completing a challenge (McGonigal 2011). We observed “flexible optimism” (regular reassessment of abilities and adaptation to a goal) and “safe failure” (approaching failure as a learning opportunity rather than a negative consequence) enabled by a multi-week ARG—with its myriad opportunities for winning, losing, and regrouping (Chess and Booth 2013). Given the rise in youth violence that occurred at the time of the game in Chicago, these game-enabled processes stood in contrast with the lack of safety and inability to take risks young people encountered in their daily lives and urban communities. The overarching metaphor of a game that saturated *The Source* allowed them to figure their everyday lived reality as a rule-bound game and, from this vantage, to interrogate and reimagine the possibilities of that game.

Each week *The Source* focused on a different STEM academic area, as well as a social-justice issue linked to urban or community life. We organized the ARG into five weekly units.

**WEEK 1: ENGINEERING, URBAN PLANNING, AND SUSTAINABILITY.** Participants learned about designing sustainable communities. Activities included mapping efficient transportation infrastructure, embarking on sustainability-oriented scavenger hunts at the university and the Museum of Science and Industry, and playing a board game about renewable energy and resource management. These activities served as introductions to the game’s cast of characters.

**WEEK 2: SCIENCE, REPRODUCTIVE HEALTH, AND COMMUNITY.** Participants honed skills in the scientific method, strategic planning, and communication across disciplinary boundaries. Activities for this week included topical card and board games, as well as interactive sessions with professionals in epidemiology, public policy, and reproductive rights. Players simulated the roles of health-care professionals and learned about Adia’s father’s interest in public-health issues.

**WEEK 3: MATH, CRYPTOGRAPHY, AND PREVENTING YOUTH VIOLENCE.** While learning about real-world applications of math, participants developed their logic and deductive reasoning skills. A cryptographer challenged them to create and crack secret codes. In a major episode, they worked with a police officer to gather evidence and reconstruct events of a fictional crime through an on-campus scavenger hunt. The week’s content focused on the effects of youth violence.

WEEK 4: TECHNOLOGY AND IMMIGRATION. Participants learned about the history of the Internet and artificial intelligence. They explored basic computing and online security. Activities included hands-on workshops on circuit building, robotics, and computer programming. The narrative focused on Adia's father and his complicated experiences with immigration.

WEEK 5: ART, STORYTELLING, AND HOMOPHOBIA. Players explored and applied film editing, art curatorship, and storytelling as modes of social engagement. Players undertook an interpretation-oriented scavenger hunt at the Art Institute of Chicago. They employed critical thinking in an interactive text adventure game and created their own digital narratives. Participants also learned about the sexual orientation of Adia's brother and worked through her father's homophobia by writing letters to Adia that explored sexual rights and her complicated family situation.

Alongside these activities, in which all teams took part, we invited participants to join in optional, hands-on Friday workshops on digital-media topics for which they could acquire both points (for their teams) and digital badges (for themselves). Digital badges are online skill achievement markers that players could earn throughout the ARG and that appeared as icons on individual profiles that they could access via the game's central website. We treated digital badges not as gamified extrinsic motivators, but instead as credentials that accurately represented the interests and skills individual acquired. Badges connected *The Source* to larger citywide summer education efforts. The goal was to have youth from all over the city earn badges and post them on a central website. We included the badges to help participants (many of whom were giving up a summer of work experience and earnings to play our game) communicate acquired skills through both our local game website and the city website.

Ideally, these badges will become a way for adults to recognize the skills these youth have acquired. Thus, badges might help demonstrate a credential, leading to new academic opportunities, internships, or career paths. In their present implementation, however, players underattended the formal workshops, most likely because they were optional and less integrated into the immersive game world. *The Source* made available badges for web designer (website creation and layout), caster (podcasting and sound design), media socialite (social-media ethics), blogger (news writing and interviewing for blogs), and documenter

(visual-media production). Weekly workshops and online exercises included short projects in which players responded to *The Source* narrative and Adia's life with their newly learned media skills.

### *Data Measures*

The evaluation of *The Source* included a range of techniques. The analysis in this article draws from mixed qualitative methods including preintervention baseline surveys, participant focus groups, one-on-one interviews with players and mentors, daily observations, and postgame surveys. All quotations that follow come from individual players who participated in focus groups. We also commissioned an external qualitative evaluation by Outlier Research and Evaluation at the Center for Elementary Mathematics and Science Education. Finally, along with these sources of data, we drew from creative documents produced by participants during game play and our own observations as game designers and educators involved in *The Source* experience.

## **Results: Narrative, Games, and Overall Program**

Before elaborating on our concept of worlding through play and the impact of improvisational game play on learning, we summarize and review results from the qualitative data regarding three relevant areas: the narrative, the game play, and the overall outcomes of *The Source*. Given the limited sample size (144 players and 133 participants in the evaluation), we use the observations about our game design and results of the game play feasibility study to draw provisional conclusions on which future research might build.

First, in creating this ARG, we were interested in the impact of the narrative. By focusing on an African American female protagonist living on the South Side of Chicago, *The Source* sought to produce a culturally specific narrative with character types who are traditionally marginalized but with whom our demographic could identify. For many players, the theme of the absent father was the most authentic aspect of Adia's story. Several commented on having a similar relationship with their fathers or mentioned knowing others with similar relationships. As one player from Focus Group 2 observed, "It was a very common story," and it was understandable that "she really wanted to know her father, regardless what he was doing." In addition to identifying with the story and characters, some players spoke about being emotionally affected by narra-

tive developments. For example, in Week 5, players learned that Adia's father might have left after being unable to face the shame of his son's homosexuality. A majority of participants reacted strongly and negatively to the idea that a father would reject a son because he was gay. They used terms such as "rude," and "inappropriate." Many noted that learning that someone was gay was not "that serious of a realization" and the response of Adia's father struck them as "old school" or "traditional." One player from Focus Group 1 noted, "I thought her dad was really cruel about that. . . . We all have our own opinions, but *he's your son* and you don't have to express your opinion to him so harshly." Alongside such narrative successes, some individuals from Focus Group 1 found the story to be "too inconsistent" or complex. Still, others wanted more interaction with the protagonists "in person" rather than the primary "online" exchanges via social media and webisodes.

Second, participants found that game play contributed to their critical thinking, teamwork capacities, and problem-solving skills. Though the game genres varied widely over the five weeks, one example that we took up in a focus group might suggest broader game-based learning benefits. In Week 2, players participated in *Infection City*, a board game we created to simulate the spread of sexually transmitted infections (STIs) across Chicago. Players needed to work cooperatively to analyze the spread of disease and to fortify their defenses through a combination of prevention and treatment techniques. One player from Focus Group 2 reported that the game showed "how fast like certain STIs can spread" and reiterated that they should "use protection." At the level of skills the game demonstrated, for another player, that "teamwork . . . even if it fails in the end, is better than goin' in individually." As another participant from Focus Group 2 observed, given time limits, the game also required players to "think on your feet" and "plan your steps out like two or three steps ahead instead of just one step ahead." Many players from Focus Group 2 found *Infection City* engaging because it was a hands-on experience. Participants also played several other games on a Hexacago board we designed representing Chicago as hundreds of hexagons that demarcated locales across the city. We discovered that some participants, Chicago residents, took the outcomes of the games more seriously because they identified with the mapped urban space. In one case, we observed that a group of players became invested in and vocal about defending their own neighborhood from the spread of an infection. Though this approach was not necessarily strategic in winning the game, it suggests their attachment to a board that was spatially recognizable and connected to their everyday lives.



Overall, *The Source* ARG had a number of perceived effects on players. One of the major influences was on a set of abilities known as twenty-first-century literacies, which include “problem solving, critical thinking, communication, collaboration, and self-management” (Pellegrino and Hilton 2012, 1). These skills are not wholly new, but they have taken on a greater significance in a historical era that depends heavily on digital and networked media as well as an expansion of affective labor and service industries. We sought to test the contention that ARGs have the potential to promote twenty-first-century literacies including cognitive, intrapersonal, and interpersonal skills (Bonsignore et al. 2012b). We found that *The Source* ARG most heavily influenced three areas for players: their intellectual curiosity, critical-thinking and problem-solving skills, and ability to work in teams (Outlier 2013). In particular, *The Source* had strong social effects on relationships among players, between players and mentors, and between mentors. Youth also noted the benefits of working in a diverse environment with players who had different perspectives and came from different backgrounds. For instance, one player from Focus Group 1 observed, “From playin’ games, I’ve gotten more used to more different types of races. So, it’s easier for me to switch up and get to know people.” Others realized the centrality of cooperation and collaboration to completing the game successfully.

### **Analysis: Worlding through Play**

Many of the most promising features of *The Source* emerged from what we are calling the process of worlding through play. To better flesh out this concept and to set up a concluding analysis of the seeming paradox of using an industrial-era term (scaling) to inform an activity that has become central in a postindustrial context (play), we first foreground three aspects of our ARG design. First, *The Source* encouraged active interplay between designers and players. Second, our ARG served as a large-scale platform for learning, encouraging flexibility and interest-driven learning. Finally, instead of offering only puzzles with single solutions, *The Source* gave players opportunities for creative production that promoted a deeper interest-driven investment in the game experience. These features encouraged participants in situated learning predicated on social play, improvisational adaptation, and intrinsic motivation.

In designing *The Source*, we also asked the central question: In an ARG, who is truly allowed to play? In most attempts to gamify education, it is the

educational reformer or teacher who is allowed to play and imagine school as a game. Gamified systems, and a good deal of educational ARGs, tend to minimize play by putting students in the position of solving simple puzzles that designers have crafted for them. Although *The Source* included several such puzzles and preestablished narrative points, we did not figure the overall game as a set playing field. With a process of worlding through play, *The Source* broke down the divide between storytellers and audiences, game designers and players, teachers and learners. We encouraged participants of this experience to understand their learning as an active process of play and continually to redefine the status of the shared game world, including open speculation about the ways in which it might be real, fictional, or both.

One emergent narrative moment demonstrates this process. In Week 3, players learned substantial portions of the backstory of Adia's lost father, Abe Adawale. One team went beyond the specified challenges for the week and began to search for Adia's father online. Using the evidence-collecting and web-search skills they had been practicing, they found a person with a nearly identical name ("Abe Adewale") who, through pure coincidence, shared many of the characteristics (age, career, and location) of the figure we had created. In this episode, *The Source* tapped into a central feature pioneered by ARGs—the this-is-not-a-game aesthetic (McGonigal 2003). By attracting players through "rabbit holes," and by upholding a consistent and systematic world throughout the experience, ARGs tend to deny, playfully, that they are either fictional or games. This aesthetic sutures the game world to the real one to make pervasive play an organic part of everyday life. Though our game's particular connection between a fictitious and real-world Abe was unplanned, the designers played back by constructing an identity theft narrative. We expanded our pre-established world in unexpected directions that led to an ending that was (even to us) unforeseen, ambiguous, and open to several interpretations. Instead of approaching this player tangent as a failure, we relinquished some control and incorporated players' interpretations into the collective narrative. In this way, we honored the benefits of play as a mode of co-creation and worlding.

This real-time responsiveness leads us to another key point. From a curricular perspective, *The Source* emphasizes an apparent paradox between play and scaling. The type of interplay that we have described thus far may seem difficult, or even impossible, to reproduce in larger scale. Nevertheless, if we conceptualize this ARG as a multiscalar and modular platform for learning, there are structural dimensions of it that can scale up without forcing a uniform

experience on a diverse population of learners. Derek Hansen and his colleagues (2013) have catalogued some of the ways that ARGs can be designed for reuse. In varied ways, games such as *Evoke*, *Ghosts of a Chance*, and *World without Oil* have been “replayed, adapted to new environments, and/or extended for new audiences” (1529). *The Source* served for us as an occasion to think through the possibility of expanding the size of an ARG, including the number of players and sites, while still preserving improvisational play dynamics and the potential for real-time adaptations to events such as the unexpected search for Abe Adawale and unplanned identity theft narrative.

Although the scale of our game included only 144 players, even this population came to the game with a diversity of skills and interests. Instead of inserting participants into a one-size-fits-all intervention, the game provided many possibilities for engagement. Kurt Squire (2006) argues that sandbox games that privilege open-ended play operate as “possibility spaces” in which players can “try on, inhabit, and ultimately develop new identities with trajectories for participation that extend out of the game world and into new spaces” such as classrooms and career contexts (5–6). These types of games “contain multiple trajectories of experiences” and “multiple trajectories outward” that may impact school affiliations and interests in game design and political change (6). Though Squire discusses mostly video games such as *Civilization III* and *Grand Theft Auto: San Andreas*, the ongoing interplay between designers and players in ARGs arguably makes these games even more ideal possibility spaces.

Building on these lessons, we designed for a diversity of player interests. The range of media and challenges in *The Source* meant that each player was unlikely to delve into every aspect of the game world or experience. Some players found themselves compelled by the narrative hook and the mysteries surrounding Adia’s father. Others were less interested in the story but were motivated by the competitive nature of the daily games. For a third group, the social nature of the ARG, cooperative team play, and the availability of attentive mentors stood out. Still, others looked forward to the digital media workshops in which they practiced creative abilities. In many cases, youth found the intersections of these areas to be engaging. Thus, even as local experiences varied, the more consistent, macrolevel game platform afforded multiple player pathways. As one participant from Focus Group 1 noted regarding the range of options and topics, “You may not like everything, ’cause they teach you a lot of engineering, STIs—like they taught us some, and computer technology—and like if you’re not interested one week, just stick with the game ’cause next week is always something different.”

To think about the game's multiple pathways, it is useful to turn to the finale. This sequence, which included several games, took place on the university campus on the final Thursday. During a timed event—a climactic “boss battle,” as it is called in a video game idiom—players engaged in a multiplayer text adventure game. In this game, they typed in textual commands and received responses that enabled them to explore a designed space. They moved through five role-playing scenarios that encouraged creative STEM-oriented problem solving and reflective decision making. This battle promoted interactions between the selected youth representatives (who typed in real-time responses on a laptop) and all of the other players of *The Source* (who offered advice and support). After the players completed the scenarios, we prompted them, in their teams, to provide closure for Adia by composing a series of photographs that the father left behind into a narrative that worked through his still unexplained disappearance. Throughout this day, players were able to participate as artists, storytellers, collaborators, and competitors. At different moments, we encouraged them to take part as individuals (minigames in the morning), as teams (the final storytelling challenge), and as a large-scale group (the text adventure boss battle).

Rather than standardizing the experience, the game opened up to different styles of contribution. We witnessed the benefits of this model most emphatically in the closing moments when each team met Adia, face to face, for the first time. In this sequence, Adia (who was previously accessible only through video and social media) arrived on site. Several players were surprised to see Adia and wondered whether the game was, after all, “real.” Adia's unexpected arrival produced a range of effects and team responses. In the final moments, each team presented a story about Adia's father that they addressed directly to her. The variations in these presentations foregrounded the idea of an ARG as a platform for multiscalar learning that provides players with different, interest-driven pathways. Some teams elected a single representative to go in front of the group and speak to Adia, while others invited each member of the group to share a fragment of the story. Teams also adopted different genres and styles, drawing on their abilities and interests. Stories ranged from the tragic to the comedic and included heartfelt speeches, spoken-word poetry, and fictional storytelling.

A final way that *The Source* demonstrated the feasibility of scaling play was through creative tasks that did not depend on narrowly targeted puzzle solving or code breaking with a single correct answer. These activities encouraged open-ended responses. Along the way, we encouraged players to imagine interdisciplinary solutions to health-care problems during the science unit,

construct their own encryptions and codes during the real-world mathematics unit, and engage in circuit-making work during the technology unit. These creative processes unfolded most consistently in the Friday workshops during which players learned and practiced skills related to blogging, podcasting, web design, photography and video production, and critical uses of social media. For example, in Week 3, which focused on math and cryptography, we moved beyond decoding and deciphering challenges. After the Friday workshop, participants responded to the mathematical content from the week in a variety of creative and interest-driven ways. One player wrote a short story incorporating aspects of code breaking that she had learned during that week. In an introductory note, she reflected on the unexpected discovery that mathematical and cryptographic tools had real-world uses: “I thought that F.B.I. agents, and spies, and bank robbers, and ex-felons, and lonely teenage boys that spend their days in their basements, or people with way too much time did this stuff. Or Osama bin Laden. I was proven wrong, as usual” (Pictureofsounds 2013). Another participant created a basic web page that defined cryptography and offered examples of various ciphers (The Source 2013a).

In these cases, participants did not merely complete games that had been created for them but played back in innovative ways. Through these workshops, participants took part in what Matt Ratto (2011) has called “critical making,” which treats “the act of shared construction itself as an activity and a site for enhancing and extending conceptual understandings of critical sociotechnical issues” (254). For instance, one participant used her understanding of Facebook to craft and circulate an informative post about youth violence, extending the social-justice themes she had studied that week into a social media project (The Source 2013b). Technological literacy, here, empowered some of our players to pursue civic and socio-political activities (Cunningham 2011).

Since we quickly conceived and rapidly prototyped many games, and players did the same with the projects they created in the workshops, few of them were polished. However, we see the chance for substantive player contributions as one major advantage of ARGs over video games. Unlike more polished video games or virtual worlds, ARGs (both in design and player contributions) frequently show their seams—the spaces between media and their constructed nature. That very lack of polish, however, can invite players to operate not merely as consumers, but also as increasingly invested coproducers of a shared experience. Moreover, the jagged transitions between media, which might be lacking in an industry-level multimedia game, made players more aware of the discrete

media and their formal interactions throughout the experience.

Overall, the active interplay between designers and players, the flexible nature of the ARG as a large-scale platform for learning, and the opportunities for creative projects contributed to a process of worlding through play. Regarding the interplay among designers and players, one participant observed that, as *The Source* unfolded, players began to “figure out how just flexible the games was. Like, they didn’t mind us, changing them, switching up, and making them better to where *we* liked to play them.”

### **Conclusion: Scaling Play**

If play, which is context specific and nongeneralizable, is such a central aspect of ARGs, how can we imagine scaling up such a game? Or, to put it differently, what is it precisely that we might scale up when we talk about replaying a large-scale ARG in another place or running it at a multicity level? In imagining ARGs as a model for scaling play, we think of them as singular experiences that cannot and should not play out in exactly the same way in each occurrence. But it does not then follow that it is impossible to reproduce or expand such a game. Certainly, an ARG is always a unique system that responds to a particular player group. The unknowns and possibilities introduced through the this-is-not-a-game aesthetic are especially crucial to this responsiveness. Moreover, they complicate the frequent rigidity of gamified education. At the same time, an ARG also maintains some stable and formal characteristics, topic areas, and transmedia affordances.

One of the most important things that an ARG enables us to scale up, more so than a rigid form, is a mode of play, a commitment to responsiveness to player interests, and a style of learning that is crafted specifically for a twenty-first-century environment and a digital media ecology. In producing blueprints for the reproduction of an ARG at other sites, designers can produce documentation that conveys ways of maintaining key play attitudes, even as other organizations translate them into different contexts. For better or worse, our postindustrial era brings new values, including an increased focus on knowledge work and information for everyday life, education, and work. The models of education that we have inherited from the late nineteenth and early twentieth centuries make, metaphorically speaking, for a bad game. As technological entrepreneur Rajat Paharia (2013) notes, this form of education supports a flawed testing regime that privileges “abstract goals (letter grades), long feedback loops (quar-

ters and semester), purposeless work (Why do I care about arctangents?), and an unclear sense of progress (Where am I in the big scheme of things?)” (153). As Cathy Davidson (2011) puts it, “Instead of testing for the best answer to discrete questions, we need to measure the ability to make connections, to synthesize, collaborate, network, manage projects, solve problems, and respond to constantly changing technologies, interfaces, and eventually, in the workplace, new arrangements of labor and new economics” (127).

We cannot reduce the capacity for play to a skill, nor should we merely attempt to instrumentalize it through top-down design that serves dogmatic market logics. Nevertheless, play is crucial to the process of learning to be flexible, adaptable, and collaborative in ways that can help learners engage in critical practice enabling them to belong to and resist the historical present. Play departs from the concepts of uniformity and standardization that emerged during industrialism and continue to drive the contemporary high-stakes testing regime. It, instead, depends on situated contexts and improvisational capacities. Play attends to the singularity of social situations and resists universals. It enables experimental approaches to processes of worlding, including flexible optimism and safe failure.

As we move forward, *The Source* leaves us with some adjustments and changes that we plan to incorporate into future ARG design and evaluation. As *The Source* continued, attendance diminished at the optional formal workshops. Nevertheless, as Chess and Booth (2013) have suggested, there are pedagogical benefits to a “play-revise-design” method in which “students create ARGs as a part of media pedagogies” (4). Moreover, many of our players voiced the desire to become game designers. The workshops that we incorporated into *The Source*, however, took players too far outside the immersion of the game. We did not sufficiently motivate these sessions through the narrative frame of Adia’s crowd sourcing. Thus, in our next large-scale summer ARG (titled *S.E.E.D.*), we elected to disentangle game play and game design, following the weeks of game play with a separate game-design workshop. This additional step of applying knowledge may also allow us to understand more concretely what skills players gained during the ARG.

One of the most successful elements of *The Source* was the mentor-led team model. Mentor training, however, included only a one-day session. If we had used a week-long mentor orientation, including an extended introduction to the game narrative and world dimensions, we believe that mentors would have become even more involved in the improvisational interplay and encouraged



more extensive play and creative contributions from players.

The focus on digital media—including webisodes and social media—to convey the narrative enabled us to create a multilinear transmedia story. At the same time, the rigid nature of the videos, which had to be written and recorded long before players viewed them, limited our capacity to improvise and adapt our narrative. One of the most robust moments of interplay, we observed, came with the inclusion of live actors in the game's finale. Thus, in future projects, we plan to include a greater number of theatrical and live-action elements.

Our game design privileged dynamic play, co-creation of a world, and intrinsic motivations for participation over gamification, top-down puzzle solving, and extrinsic motivations for advancement. Even so, in our initial curiosity about gamified systems, we still incorporated elements such as points and leader boards that quantified participation and encouraged competition. Many of the players felt unmotivated by or were even unaware of the points that they accumulated from each challenge. In future ARGs, we hope to encourage greater cooperation and collaboration—and less instrumental forms of game play—among participants by deemphasizing gamified elements.

We saw the benefits of real-time game design, in which designers created new games from week to week in response to player engagement. However, the logistical complexity and resources required to produce an ARG for five weeks made it difficult to create and balance additional games on the fly. In future projects, we plan to attend more closely to ongoing narrative and role-playing adaptations while predesigning all games and challenges.

As we continue to study ARGs, we are also interested in tracking long-term outcomes of these games not only on cognitive capacities, but also on the intrapersonal and interpersonal capacities of the players. While we are collecting longitudinal data about student academic achievement, ARGs are also ideal for studying youth collaboration. In follow-up interviews to *The Source*, we asked students to answer questions about whether the game “helped them work more collaboratively with peers at school,” “solve problems with the help of others,” or “develop skills as a leader.”

In conclusion, ARGs tap into the multiscalar potential of play. ARGs are large-scale games that often incorporate substantial player contributions. ARGs, however, also present modular platforms that incorporate many minigames and local experiments, each of which might succeed or fail in a variety of ways and give groups of young players numerous local chances to reimagine the status of the shared game. In either case, in a historical moment in which casual games are

increasingly popular, ARGs offer an opportunity for noncasual and long-lasting engagements. As one Focus Group 1 player of *The Source* noted, “It takes some time to realize that you’re going to have to stick with it for the long run for it to get interesting. . . . When I first came here, . . . I wasn’t feeling it and [had to] give it more time to know . . . my group. I got more into it, and I actually felt like coming every day.” The long duration of an ARG like *The Source* establishes a fictional world as an ongoing reality and encourages a depth of engagement over several weeks of play, cocreation, and reflection. Moreover, it opens up many possibilities for deeper bonds between players (including designers), more sustained connections that promote transdisciplinary forms of learning, and opportunities for interest-driven worlding that produce meaningful investments in a play experience. While ARGs are not the only experimental media form that produces such an experience, they offer a compelling model for thinking through the process of scaling the seemingly unscalable mode of play.

#### REFERENCES

- Battles, Jason, Valerie Glenn, and Lindley Shedd. 2011. “Rethinking the Library Game: Creating an Alternate Reality with Social Media.” *Journal of Web Librarianship* 5:114–31.
- Bawden, David, and Lyn Robinson. 2002. “Promoting Literacy in a Digital Age: Approaches to Training for Information Literacy.” *Learned Publishing: Journal of the Association of Learned and Professional Society Publishers* 15:297–301.
- Bennett, Albert, Beatrice L. Bridglall, Ana Mari Cauce, Howard T. Everson, Edmund W. Gordon, Carol D. Lee, Rodolfo Mendoza-Denton, Joseph S. Renzulli, and Judy K. Stewart. 2004. *All Students Reaching the Top: Strategies for Closing Academic Achievement Gaps*.
- Bonsignore, Elizabeth, Derek Hansen, Kari Kraus, and Marc N. Ruppel. 2012a. Alternate Reality Games: Platforms for Collaborative Learning. *Proceedings of the 10th International Conference of the Learning Sciences*, edited by International Society of the Learning Sciences, 251–58.
- . 2012b. “Alternate Reality Games as Platforms for Practicing 21st-Century Literacies.” *International Journal of Learning and Media* 4:25–54.
- Chess, Shira, and Paul Booth. 2013. “Lessons down a Rabbit Hole: Alternate Reality Gaming in the Classroom.” *New Media & Society* 16:1002–17.
- Cunningham, Carolyn. 2011. “Girl Game Designers.” *New Media & Society* 13:1373–88.
- Davidson, Cathy N. 2011. *Now You See It: How the Brain Science of Attention Will Transform the Way We Live, Work, and Learn*.
- Davis, Cinda-Sue, Angela B. Ginorio, Carol S. Hollenshead, Barbara B. Lazarus, and

- Paula M. Rayman. 1996. *The Equity Equation: Fostering the Advancement of Women in the Sciences, Mathematics, and Engineering*.
- Dena, Christy. "Christy's Corner of the Universe: ARG Stats," last modified December 8, 2008. <http://www.christydena.com/online-essays/arg-stats/>.
- Dewey, John. 1916. *Democracy and Education*.
- Expanding Underrepresented Minority Participation: America's Science and Technology Talent at a Crossroads*. 2011. Prepared by the Committee on Underrepresented Groups and the Expansion of the Science and Engineering Workforce Pipeline and the Committee on Science, Engineering, and Public Policy, Policy, and Global Affairs in cooperation with the National Academy of Sciences, Engineering, and Medicine.
- Gee, James Paul. 2004. *Situated Language and Learning: A Critique of Traditional Schooling*.  
\_\_\_\_\_. 2007. *What Video Games Have to Teach Us about Learning and Literacy*.
- Groh, Fabian. 2012. "Gamification: State of the Art Definition and Utilization." In *Proceedings of the 4th Seminar on Research Trends in Media Informatics Institute of Media Informatics*, edited by Naim Asaj, Bastian Konings, Mark Poguntke, Florian Schaub, Björn Wiedersheimm, and Michael Weber, 39–46.
- Hainey, Thomas, Thomas Connolly, Mark Stansfield, and Liz Boyle. 2011. "ARGuing for Multilingual Motivation in Web 2.0: An Evaluation of a Large-Scale European Plot." In *Handbook of Research on Improving Learning and Motivation through Educational Games*, edited by Patrick Felicia, 240–60.
- Hansen, Derek, Elizabeth Bonsignore, Mark Ruppel, A. Visconti, and Kari Kraus. 2013. "Designing Reusable Alternate Reality Games." Paper presented at the Conference on Human Factors in Computing Systems. Paris, France, 2013.
- Hayles, Katherine N., Patrick Jagoda, and Patrick LeMieux. 2014. "Speculation: Financial Games and Derivative Worlding in a Transmedia Era." *Critical Inquiry* 40: 220–36.
- Holland, Walter, Henry Jenkins, and Kurt Squire. 2003. "Theory by Design." In *The Video Game Theory Reader*, edited by Mark J. P. Wolf, and Bernard Perron, 25–46.
- Hoffman, Kathryn, Charmane Llagas, and Thomas D. Snyder. 2003. *Status and Trends in the Education of Blacks*.
- Isaacs, Susan. 1929. *The Nursery Years*.
- Jagoda, Patrick. 2013. "Gamification and Other Forms of Play." *Boundary 2*. 40:113–44.
- Jenkins, Henry. 2006. *Convergence Culture: Where Old and New Media Collide*.
- Kaiser, Matthew. 2012. *The World in Play: Portraits of a Victorian Concept*.
- Kim, Jeffrey, Elan Lee, Timothy Thomas, and Caroline Dombrowski. 2009. "Storytelling in New Media: The Case of Alternate Reality Games, 2001–2009." *First Monday* 14:1.
- Lindau, Stacy Tessler, Jennifer A. Makelarski, Marshall H. Chin, Shane Desautels, Daniel Johnson, Waldo E. Johnson, Doriane Miller, Susan Peters, Connie Robinson, John Schneider, Florence Thicklin, Natalie Watson, Marcus Wolfe, and Eric Whitaker. 2011. "Building Community-Engaged Health Research and Discovery Infrastructure on the South Side of Chicago: Science in Service to Community Priorities." *Preventive Medicine* 52: 200–07.

- Livingstone, Sonia M. 2002. *Young People and New Media: Childhood and the Changing Media Environment*.
- Logan, John R., and Brian Stults. 2011. *The Persistence of Segregation in the Metropolis: New Findings from the 2010 Census*, census brief prepared for Project US2010, March 24, 2011.
- Massumi, Brian. 2002. *Parables for the Virtual: Movement, Affect, Sensation*.
- McGonigal, Jane. 2003. "This is Not a Game: Immersive Aesthetics and Collective Play." In *Proceedings of the 5th International Digital Arts and Culture Conference: Streamingworlds*," edited by RMIT University, 110–18.
- \_\_\_\_\_. 2011. *Reality Is Broken: Why Games Make Us Better and How They Can Change the World*.
- Montola, Markus, Jaakko Stenros, and Annika Waern. 2009. *Pervasive Games: Theory and Design*.
- Niemeyer, Greg, Antero Garcia, and Reza Naima. 2009. "Black Cloud: Patterns towards da Future." In *MM '09: Proceedings of the 17th ACM International Conference on Multimedia*, edited by the Association for Computing Machinery, 1073–82.
- Outlier Research and Evaluation, Center for Elementary Mathematics and Science Education (2013) *Outcomes: The Source*. Report <http://outlier.uchicago.edu/the-source/>.
- Paharia, Rajat. 2013. *Loyalty 3.0: How to Revolutionize Customer and Employee Engagement with Big Data and Gamification*.
- Pellegrino, James, and Margaret L. Hilton, eds. 2012. *Education for Life and Work: Developing Transferable Knowledge and Skills in the 21st Century*.
- Pelletier, Caroline. 2009. "Games and Learning: What's the Connection?" *International Journal of Learning and Media* 1:83–101.
- Piaget, Jean. 1965. *The Moral Judgment of the Child*.
- Pictureofsounds. "Decoding the Past: A Story," last modified July 27, 2013. <https://pictureofsounds.wordpress.com/2013/07/27/decoding-the-past-a-story/>.
- Ratto, Matt. 2011. "Critical Making: Conceptual and Material Studies in Technology and Social Life." *The Information Society* 27:252–60.
- Salen, Katie. 2007. "Gaming Literacies: A Game Design Study in Action." *Journal of Educational Multimedia and Hypermedia* 16:301–22.
- Stewart, Sean. "Alternate Reality Games." <http://www.seanstewart.org/interactive/args/>.
- Stokes, Benjamin, Jeff Watson, Tracy Fullerton, and Simon Wiscombe. 2013. "A Reality Game to Cross Disciplines: Fostering Networks and Collaboration." In *Proceedings of DiGRA 2013: DeFragging Game Studies*, edited by Digital Games Research Association, 1–17.
- Sutton-Smith, Brian. 1971. "The Role of Play in Cognitive Development." In *Child's Play*, edited by Robin E. Herron and Brian Sutton-Smith, 252–60.
- \_\_\_\_\_. 1997. *The Ambiguity of Play*.
- \_\_\_\_\_. (2013a) Breaking the Code. <http://thesource.uchicago.edu/designer/oscarweek3/>.
- \_\_\_\_\_. (2013b) Reflection Highlights Week 3. <http://thesource.uchicago.edu/week3/>.

- Thomas, Douglas, and John Seely Brown. 2011. *A New Culture of Learning: Cultivating the Imagination for a World of Constant Change*.
- Urban, Wayne J., and Jennings L. Wagoner, Jr. 2009. *American Education: A History*.
- Vygotsky, Lev. S. 1978. *Mind in Society: The Development of Higher Psychological Processes*.
- Wilkofsky Gruen Associates. 2012. *Global Entertainment and Media Outlook 2012–2016: Industry Overview*. Available at <http://www.careercatalysts.com/pdf/PwCOutlook2012-Industry%20overview%20%283%29.pdf>.
- Wilson, Rob. 2007. "Afterword: Worlding as Future Tactic." In *The Worlding Project: Doing Cultural Studies in the Era of Globalization*, edited by Christopher Leigh Connery and Rob Wilson, 209–23.
- Young, Michael F., Stephen Slota, Andrew B. Cutter, Gerard Jalette, Greg Mullin, Benedict Lai, Zeus Simeoni, Matthew Tran, and Mariya Yukhymenko. 2012. "Our Princess Is in Another Castle: A Review of Trends in Serious Gaming for Education." *Review of Educational Research* 82:61–89.
- Zimmerman, Eric. 2009. "Gaming Literacy: Game Design as a Model for Literacy in the Twenty-First Century." In *The Video Game Theory Reader 2*, edited by Bernard Perron and Mark J. P. Wolf, 23–32.