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Toward an Ecology of Gaming

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A time is marked not so much by ideas that are argued about as by ideas that are taken for granted.
—Jonathan Letham¹

1954. West Germany gains an unexpected 3-2 victory over Hungary in the World Cup, known from then on as The Miracle of Bern. Officials announce that an American hydrogen bomb test had been conducted on Bikini Atoll in the Pacific Ocean. Marilyn Monroe weds Joe DiMaggio. The Geneva Conference partitions Vietnam into North Vietnam and South Vietnam. Mathematician Alan Turing commits suicide. "Gaming as a Technique of Analysis" is released, praising games as designed models with which to think.

When viewed from this perspective, 1954 looks a lot like 2007: a year of instability and transformation on the world stage, a year shadowed by the promise and threat of competing ideologies, a year colored by fear, hope, and the advent of new technology. 1954 was also a year, like this year, when games entered the popular lexicon and *man the player* was seized upon as a harbinger of change. By 1954, Piaget had mapped the moral judgment of a child through a study of his or her coming to know the rules of a game;² Turing had contributed

Connie Yowell of the MacArthur Foundation was an early champion of video games, game design, and game studies as valuable players in the digital media and learning conversation. This volume, and much of the research it contains, would simply not exist without her support or that of the MacArthur Foundation. An amazing duo—Michael Carter and Ruth Rominger of the Monterey Institute for Technology and Education—provided invaluable advice, guidance, and editorial support throughout the process. Joanne Weiss lent her sharp eye and expertise to many of the early drafts, and both Tara McPherson and Anna Everett contributed immensely to my thinking over the course of the project.

I'd also like to thank the participants of "Everywhere Now: Kids, Games, and Learning," a three-week online dialogue that did much to enliven and enrich this volume; they shared ideas, anecdotes, and research that deepened my own thinking, as well as that of the contributing authors. In an era in which time is a most precious commodity, all of these remarkable individuals gave of theirs freely, and the volume is much the richer for it. Contributors included Matteo Bittanti, Douglas Rushkoff, Jane Pinkard, Kallen Tsikalas, Wagner James Au, Mary Flanagan, Tracy Fullerton, Lizbeth Goodman, Justin Hall, Toby Miller, Michael Nitsche, Jane Park, Clay Shirky, Betty Hayes, Constance Steinkuhler, Eric Zimmerman, Andrew Burn, Diane Carr, Victoria Carrington, Mechelle De Craene, Jay Lemke, Mark Marino, Linda Polin, Bernie DeKoven, Jason Della Rocca, Nichole Pinkard, Brian Thompson, Joe Beckmann, Phil Bell, Carrie Heeter, Joel Josephson, Reid Kimball, Beth Kolko, and Robert Torres. Lastly, tremendous thanks to the other editors in the MacArthur Series—Lance Bennett, David Buckingham, Tara McPherson, Anna Everett, Andrew Flanagan, and Miriam Metzger—for their support, intellect, and generosity.

to “Digital Computers Applied to Games, of Faster than Thought”;³ Huizinga had released his seminal study of play, *Homo Ludens*⁴ sixteen years earlier, setting the stage for Caillois’s *Les Jeux et Les Hommes* in 1958; and two analysts from the Rand Corporation, A. M. Mood and R. D. Specht, chose 1954 as the year to present “Gaming as a Technique of Analysis”⁵ as part of a symposium on the use and value of war game methods. Interested in the role which players could play in modeling the behavior of a complex system, upon closer inspection the two scientists found something more: “A virtue of gaming that is sometimes overlooked by those seeking grander goals . . . is its unparalleled advantages in training and educational programs. A game can easily be made fascinating enough to put over the dullest facts. To sit down and play through a game is to be convinced as by no argument, however persuasively presented.”⁶ An idea that to many seems new today turns out to have graced the lips of researchers some fifty-odd years ago.

What was missing in 1954, however, was the presence of a generation of kids who knew no time untouched by the promises and pitfalls of digital technology. Born into a world where concepts like copyright, mastery, civic engagement, and participation are seamlessly negotiated and redefined across highly personalized networks spanning the spaces of Facebook, *Yu-Gi-Oh*, and YouTube, today’s kids are crafting learning identities for themselves—hybrid identities—that seemingly reject previously distinct modes of being. Writer, designer, reader, producer, teacher, student, gamer—all modes hold equal weight. Where we used to call them *player-producers*, *prosumers*, or even *multitaskers*, we now just call them *kids*. The phrase that best explains this change comes from Mikey, a participant in one of our contributors’ studies, who in talking about games said, “It’s what we do.” The “we” to which he was referring was kids these days, the young people of his generation.

It is this condition of digital “kidness” as it pertains to games, which serves as the focus of *Ecology of Games*. Part of the MacArthur Foundation Series on Digital Media and Learning, its authors explore many of the core issues arising from a consideration of the impact of games and gaming within social, cultural, and learning domains. Four main questions guide the work throughout:

- What forms of participatory practices do games and gaming engender for youth; which forms of learning are present, missing, or reinforced through gaming?
- What *gaming literacies*, or families of practice produced by games and gaming attitudes, do we see emerging?
- How does gaming act as a point of entry or departure for other forms of knowledge, literacies, and social organization?
- What barriers of entry into gaming and game communities exist, and what are the implications for those who haven’t been invited to play?

Although there has been a considerable amount written on games and young people’s use of them, there has been little work done to establish an overall “ecology” of gaming, game design, and play, in the sense of how all of the various elements—from code to rhetoric to social practices and aesthetics—cohabit and populate the game world. Purposefully broad in scope and multidisciplinary in perspective, *Ecology of Games* is intended to complexify a debate around the value of games and gaming that has been, to date, overly polemic and surprisingly shallow. The language of the media is replete with references to the devil (and heavy metal) when it comes to the ill-found virtues of video games, while a growing movement in K–12 education casts them as a Holy Grail in the uphill battle to keep kids

learning. While many credit game play with fostering new forms of social organization and alternative ways of thinking and interacting, more work needs to be done to situate these forms of learning within a dynamic media ecology that has the participatory and social nature of gaming at its core. My goal, and that of the authors selected for inclusion, is to pepper this often black-and-white mix with shades of gray, pointing toward a more sophisticated understanding of the myriad ways in which gaming could and should matter to those considering the future of learning.

Structure of the Volume

Three sections organize the collection: “Learning Ecologies,” “Hidden Agendas,” and “Gaming Literacies.” While this tripartite structure may set up an expectation of separation or even of progression across chapters, this is due more to publication within a traditional book format and less to any real conceptual division between them. With that said, the three sections do bring together a subset of chapters to thematically organize what is, admittedly, a wide-ranging collection. This breadth comes both from an attempt to map gaming as an ecology of concerns drawn from a range of contexts and from a series of disciplinary perspectives. Contributors come from education, the learning sciences, film studies, technology, anthropology, game design, performance studies, computer science, and youth development. Such a diversity of perspectives leads to a condition of both wealth and poverty. Wealth comes in the form of new frameworks, methodologies, and alternate histories that enrich the dialogue with multiple points of view; poverty comes in the choice of breadth over depth and in the challenge of locating a common vocabulary. We could not even decide on a shared name to refer to our object of study—games, digital games, video games? In the end we decided to use them all; each name came with subtleties and distinctions that would have been lost within a unifying framework.

The development process gained an additional dimension with the inclusion of an online dialogue entitled, “Everywhere Now: Kids, Games, and Learning,”⁷ which brought together experts from around the world to discuss how, if, and why kids were infusing their gaming with learning, or vice versa. This online conversation benefited all those involved in writing for this volume, as the dialogue provided an excellent test bed for ideas and arguments. I came away from it having gained an even greater respect for the challenges and complexities of the subject at hand.

Learning Ecologies

Contributions from James Paul Gee, Reed Stevens, Tom Satwicz, Laurie McCarthy, and Amit Pitaru explore the spaces of intersection between gaming, the design of dynamic and player-driven learning spaces, and the role each plays for kids familiar with or coming to know video games. These chapters articulate a form of *learning ecology* present in the way kids game. The volume opens with “Learning and Games.” In this chapter, Gee takes on the intersection of game design and good learning, choreographing potential sites of engagement between the two by drawing on contemporary work in the learning sciences. Well established as an authority within the video games, learning, and literacy space, Gee creates a useful foundation upon which many of the other authors in the volume draw.

Stevens, Satwicz, and McCarthy follow with “In-Game, In-Room, In-World”—a captivating ethnography of young people in different families playing video games in their own homes.

Based on previous research work in everyday cognition and informal learning, they came to this study by way of an interest in how children spend their time and what they learn in the process. Rather than holding to a *separate worlds* view, which posits that game play takes place in a world separate from other activities, the authors instead argue that the culture of video game play is one deeply “tangled up” with other cultural practices. These practices include relations with siblings and parents, patterns of learning at home and school, as well as imagined futures for oneself. Given the relative scarcity of empirical research on video game play, this study creates a model for how such work might be done in the future. While it remains to be seen whether the frameworks of “separate” and “tangled up” are truly opposed, Stevens, Satwicz, and McCarthy take a strong step toward refining our understanding of each.

Designer Amit Pitaru concludes Section 1, providing an overview of his work with the Henry Viscardi School in adapting mainstream video games for play by children with disabilities. Arguing for a larger ecology of accessible design for players who have traditionally been barred from entry into gaming, he traces the impact of coming to learn to game on the educational, social, and therapeutic life of a child with special needs. The accessibility mandate outlined by Pitaru goes beyond impacting kids with special developmental or cognitive needs, however. He argues that making digital games accessible to a wider audience benefits everyone by providing opportunities for play across communities. He cites a closed captioning mod for *Doom-3* that provides auditory information in the form of text (or other) visuals. Rather than simply allowing players who may be hard of hearing to increase their quality of play, the mod has been taken up and used by many English language learners to help them learn and understand English better.⁸

Within the commercial gaming industry, there have been few attempts to address issues of accessibility in video gaming despite the fact that more and more people are beginning to recognize that the right to play is a developmental right. As kids get left out—not only of video game play but also of other digitally based experiences popular among their peers—they will continue to fall further and further beyond. Pitaru’s piece provides a much-needed call to action supported, in part, by the increasing work in the IGDA, Games for Health, and Serious Games initiatives; significantly, any change requires buy-in from the game development community too, if the situation is to be affected.

Hidden Agendas

The link between games and learning is not a contemporary phenomenon, nor a digital one. Long before *Math Blaster* or *Oregon Trail* hit the market, games have been used as learning tools. Members of the volunteer Militia of Rhode Island played *American Kriegsspiel* in the years following the Civil War, theater games like *Sibling Rivalry* were used in contexts ranging from activism to acting, and Fröebel’s invention of kindergarten in 1840 was premised in large part on the integration of learning through games and play. Attempts to use computer technologies to enhance learning began with the efforts of pioneers such as Atkinson, Morningstar, and Suppes in 1968; the presence of computer technology in classrooms has increased dramatically since that time, including the use of games and simulations.⁹

In “Education V. Entertainment” Mizuko Ito acknowledges this history and argues that it is critical to understand not only the historical conditions under which a digital game has been produced, but also how it gets taken up and regulated in different contexts of play. Ito uses the concepts of *media production* and *participation genres* to read across the circuits of culture influencing styles of representation, practice, and institutional structure in children’s software development. In order to build an agenda for how video games could

contribute to systemic change in learning and education, Ito suggests it is “necessary—but not sufficient—to analyze representational content and play mechanics.”¹⁰ Her chapter outlines a framework for doing so, which is then built upon both by Ondrejka and by Everett and Watkins elsewhere in the volume.

“The Rhetoric of Video Games,” by Ian Bogost, focuses on video games as contexts for the circulation, interpretation, and deployment of meaning. Bogost introduces the concept of *procedural rhetoric*, the art of persuasion through rule-based representations and interactions. Bogost is part of a growing body of researchers, many from the realms of computer science and design more generally, who recognize games as process-based systems that produce models and representations algorithmically through player interaction. This perspective is significant because it points to a quality distinguishing video games from other media (like films, television, and books), beyond their status as interactive or participatory systems. More specifically, citing games like *Animal Crossing*, *Bully*, and *America’s Army*, Bogost looks at the systemic approach used by video games to construct arguments about the way social or cultural systems work in the world. Players learn to interpret these arguments and eventually make arguments of their own. Such a perspective opens up the possibility for defining a set of new literacies associated with reading, producing, and playing games, a set of *gaming literacies* further explored in Section 3 of this volume. According to Bogost,

Playing video games is a kind of literacy. Not the literacy that helps us read books or write term papers, but the kind of literacy that helps us make or critique the systems we live in When we learn to play games with an eye toward uncovering their procedural rhetorics, we learn to ask questions about the models such games present. (p. 136)

Anna Everett and S. Craig Watkins actively put this rhetorical framework to work in their chapter “The Power of Play,” which considers how race and gender are codified, constructed, and performed within a gaming ecology. In what ways, they ask, do young people’s interactions with video games influence how and what they learn about race and gender? Can games facilitate learning that is antisocial? Taking on popular video game titles like *Saint’s Row*, *Bully*, and *NBA Street*, they show that by striving to locate players in what are often promoted as graphically real and culturally “authentic” environments, urban/street games produce some of the most powerful, persistent, and problematic lessons about race in American culture. Like Ito, Everett and Watkins locate the issue of representation as an important voice within the ongoing conversation regarding the digital divide. They conclude their chapter by advocating the need to expand the discussion of games and learning to include concerns about access to and participation in digital media culture, communities, and user-generated content.

Gaming Literacies

Whereas education in the early part of the twentieth century focused on the acquisition of basic literacy skills—simple reading, writing, and calculating—many believe that education in the twenty-first century must focus on high literacy skills such as the ability to think, read, and interact critically, to solve complex problems in mathematics and science, and to express oneself persuasively through language and media. The meaning of *knowing* today has “shifted from being able to remember and repeat information to being able to find and use it.”¹¹ Designing pedagogical approaches to support this form of knowing involves deep changes not only in the ways instruction is delivered, but also in

the tools and technologies involved. The work of John Bransford, Roy Pea, Brigid Barron, and others has been particularly instructive in this respect, as has that of researchers like Colin Lankshear, Michele Knobel, and Rebecca Black, who have studied the acquisition of new literacies in contexts such as fan fiction, blogging, and video remixing.¹² Computer scientists Seymour Papert and Mitchel Resnick pioneered thinking about how the acquisition of a programming language empowers kids to model knowledge within learner-driven contexts. This approach has been mirrored over the years in the development of products like Mindstorms[®], and open-source tools and programming languages like Logo[®], Squeak[®], Scratch[®], and Alice[®], designed to teach procedural thinking, problem solving, and logic.

Taken in sum it is clear that contemporary research influencing the games and learning space has started to move beyond an analysis of media as a way to become literate about it, and toward an emphasis on creative production and the principles of design as a starting place and main area of emphasis with kids. Former digital kid Justin Hall has said that he “continues to believe that literacy, language, and personal expression will stem from increasing exposure to flexible rule sets and iterative systems for solving small problems.”¹³ Like Hall, the contributors to this volume, each in his or her own way, shares in the belief that exposure to the flexible rule sets and iterative, cyclical play embodied in both design and gaming practices are critical for thinking about literacy in the twenty-first century.

Gaming Literacies, the final section in the volume, builds on this belief, refining a thread that runs through the volume as a whole. Each of its four chapters offers a case study of a specific type or genre of video game—sandbox or simulation games, alternate reality games, online casual games, and virtual worlds. I felt it was important to conclude the volume with a number of studies that put theory into practice, as a way to illuminate some of the real difficulties that arise around activating games as learning frameworks. Specific in focus, each study defines clear limitations as to the applicability of its proposed model. While Kurt Squire discusses the learning merits of open-ended simulation or sandbox games, he does not suggest that his model will work in the same way for players of the alternate reality games Jane McGonigal makes the focus of her research. Cory Ondrejka looks closely at the way certain design-oriented gaming literacies are supported in *Second Life*, but makes no claims for any standardized outcomes. In fact, each author argues for the distinctiveness of learning instigated and acquired by each participant *on his or her own terms*. It appears that to be literate within the family of practices activating the ecology of games is to achieve status as a unique and distinctive learner. This does not bode well for those seeking a silver bullet to slay the games and learning beast. It does suggest, however, that ongoing work will need to be done to design and support a *set* of gaming and learning frameworks for use by students, parents, teachers, and researchers.

Gaming Literacies begins with Squire’s chapter, “Open-Ended Video Games,” which attempts to take into account a set of disparate activities that partially define the current landscape of work around games and learning. These include studies of gamers and gaming culture, game design work modifying commercial computer games, and educational design research orchestrating social events around them. His chapter offers a theoretical model for video game-based learning environments as designed experiences, focusing on open-ended simulation games, modeled by both the *Grand Theft Auto* and *Civilization* series with which he has been working for a number of years. He ties together studies of gamers “in the wild,” within school, and in afterschool programs designed specifically for learning. He concludes

with an investigation of how such games develop players' *productive* literacies, an ability to use digital technologies to produce both meanings and tangible artifacts.¹⁴ Squire's interest is in both observing and analyzing the learning occurring in these commercial, off-the-shelf games, and also in transforming this understanding into an effective and repeatable design framework.

Within the types of learning systems discussed by Squire, players are encouraged to develop specific areas of expertise, separate from one another and perhaps even from those of their mentors or teachers. Squire shows that as students progress, they develop new interests, which then propel them out of the community of practice toward new areas of interest, such as game design or ancient history.¹⁵ Recognizing that such an approach is antithetical to the way most schools currently operate, Squire looks to video games not only as contexts for gaming but as doorways or catalysts for the acquisition of knowledge. Squire's work shows that the value of gaming may not only be in the recruiting of productive, gaming literacies, but in driving kids to discover and nurture interests they may not know they have.

This theme is taken up by Jane McGonigal in "*Why I Love Bees*," a case study on massively multiplayer alternate reality games. These search and analysis style games operate for players as immersive tutorials in network collaboration and coordination. According to McGonigal, players of such games develop a new kind of digital network literacy, one specifically tuned to the techniques, challenges, and rewards of massively scaled collaboration. Using the game *I Love Bees* as her model, she explores how real-time game design, or "puppet mastering," can be used to support and further develop the multiple tracks of engagement that emerge from players' diverse perspectives.

McGonigal notes that as massively social experiences, alternate reality games are especially well suited to encouraging metalevel reflection on the skills and processes that players use to meet new challenges. Being part of a massively multiplayer game community, she argues, means sharing your thoughts and experiences with your fellow players. Further, she demonstrates that games like *I Love Bees* are part of a larger cultural trend toward an age of powerful networked collaboration. If this is the case, we must take care to prepare students for entry into these networks. As Henry Jenkins has noted, "We are just learning how to exercise that power—individually and collectively—and fighting to define the terms under which we will be allowed to participate."¹⁶

In "Education Unleashed," Cory Ondrejka uses the history of virtual worlds as a context for building an argument around the role new technology is playing in defining when, where, and how kids learn. Chief Technology Officer for Linden Lab (the creators of *Second Life*), Ondrejka is an unapologetic advocate for the use of virtual worlds as a building block of the future of learning. Connecting the cost of learning to innovation and knowledge creation, he suggests that it is the lower cost of learning in virtual worlds that is transformative. "For the first time, geography is not the primary determining factor in who can learn together or who can teach" (p. 243).

Ondrejka points to the heterogeneous, scaffolded, and peer-supported pedagogy that has emerged from *Second Life*, a model echoed in the work of a number of game studies researchers. According to Constance Steinkuhler "Online technologies provide new opportunities for 'anytime/anywhere' social interaction, and the number of innovative curricular designs that incorporate online collaborative environments has been steadily increasing since such technology first emerged."¹⁷

This fact is supported by the breadth and depth of styles of learning that Ondrejka has witnessed in *Second Life*, from in-world classes in the scripting language to mixed-reality

conferences about the future of broadcasting. As Ondrejka shows, a tremendous variety of both amateurs and experts is currently leveraging *Second Life* as a platform for learning.

Barry Joseph, in “Why Johnny Can’t Fly,” rounds out the volume with an overview of how his organization, Global Kids, treats gaming as a form of youth media. Joseph’s chapter is distinctive in its documentation of missteps and successes in working within a youth development context. In his work we see a grappling with the “problem of pedagogy” around game-based learning that infuses so much of the work represented here. Through a playful description of a series of innovative programs, Joseph offers a peek into Global Kids’ attempts to develop critical thinking skills that are not necessarily designed for passing standardized tests. While *No Child Left Behind*¹⁸ is rarely mentioned in these pages, its specter continues to be felt by all.

As these case studies show, understanding the ways in which the structures of games themselves elicit particular attitudes toward action, interaction, and knowing is endlessly beneficial. Acknowledging that games *already* operate as robust learning systems forces a focus on the intrinsic qualities and characteristics that guide the types of learning and new literacies gaming and games advance. Learning to “read” a game system in order to play with it points toward a specific kind of gaming literacy connected, in part, to the ability of a player to understand how systems operate, and how they can be transformed. Modding and world-building, which form the basis for much of the play of MMOs and virtual worlds (for example), might be another such gaming literacy, while learning how to navigate a complex system of out-of-game resources—from game guides, FAQs, walkthroughs, and forums to peer-to-peer learning—might represent another. A third gaming literacy might be seen in the learning that takes place in negotiating the variable demands of fair play: players must become literate in the social norms of a specific gaming community, learning what degree of transgression is acceptable and when a player has crossed the line. A fourth is learning how to collaborate within a multiplayer space, where knowledge is distributed and action is most often collective.

Yet the circuits of production, distribution, and play of games involve ongoing tensions between industry relations, distribution infrastructure, patterns of player/viewer engagement, genres of representation, social agendas, and educational philosophies. These tensions affect how we think about which literacies an ecology of gaming supports and which it potentially denies. Bertram C. Bruce sums this situation up when he writes,

Adolescents need to learn how to integrate knowledge from multiple sources, including music, video, online databases, and other media. They need to think critically about information that can be found nearly instantaneously through out the world. They need to participate in the kinds of collaboration that new communication and information technologies enable, but increasingly demand. Considerations of globalization lead us toward the importance of understanding the perspective of others, developing a historical grounding, and seeing the interconnectedness of economic and ecological systems.¹⁹

Gaming can allow players to experience various perspectives. In his framing of games as procedural systems, Bogost offers just such a consideration. “Video games are not just stages that facilitate cultural, social, or political practices; they are also media where cultural values themselves can be represented—for critique, satire, education, or commentary” (p. 119). Can we teach players (and their parents and teachers) how to read games in order to ask questions about the models they represent? Absolutely, and Bogost offers the beginnings of a framework to do so. Is this a way that kids learn how to debate or do history or math? Not necessarily. This is where the real work needs to be done to better understand the connections between forms of gaming and certain kinds of acquired knowledge and practice. Such work

must be studied at the level of discourse and lived, embodied practices, as these are the levels on which games live.²⁰ Some of the most innovative research currently being done in this area focuses on assessment and the need to develop models that take into account the conditions leading to the literacies previously described.²¹

Discovering what literacies are general and specific to games may lead to new approaches to the creation of both games and other learning environments.

Beyond Game

The concept of *gaming* as it is used in the following pages goes beyond games, in the same way that *learning* goes beyond the configuration of a classroom. Gaming constitutes the sum total of activities, literacies, knowledge, and practices activated in and around any instance of a game. Gaming is play across media, time, social spaces, and networks of meaning; it includes engagement with digital FAQs, paper game guides, parents and siblings, the history of games, other players, as well as the games themselves. It requires players to be fluent in a series of connected literacies that are multimodal, performative, productive, and participatory in nature. It requires an attitude oriented toward risk taking, meaning creation, nonlinear navigation, problem solving, an understanding of rule structures, and an acknowledgment of agency within that structure, to name but a few.²²

Gaming also requires what Jay Lemke and others have referred to as a “stance of playfulness,” a cognitive attitude tied directly to the creative, improvisational, and subversive qualities of play. Huizinga would call this the *lusory attitude*, the attitude required of players in order to play.²³ To play a game is, in many ways, an act of faith that invests the game with special meaning—without willing players the game is a formal system waiting to be inhabited, like a recipe for baking or choreographer’s score. As designed systems, games offer certain terms of engagement, rules of play that engender stylized forms of interaction. Gamers not only follow rules, but push against them, testing the limits of the system in often unique and powerful ways. Yet it is in the moment when “pushing against” is transformed into a metareflective “questioning about” that learning truly takes place, as Squire points out in his study of Apolyton U, an informal online community of players founded to extend players’ interest and learning while playing *Civilization III*.

Here players are parsing not only the underlying rule system of the game, but the complex set of interrelationships which make up this rule system. Players dissect the game system, modify the underlying rule set for various purposes. . . design their own scenarios to communicate particular ideas, and run their own courses on specific ideas. (p. 185)

A study of how learning works in such communities provides an opportunity to push on existing concepts of what virtuosity means within such systems.

As Stevens, Satwicz, and McCarthy note,

Practices—even practices like video game play that constitute a seemingly separate world—substantially acquire meanings for people not because they have this or that property (e.g., interactivity or narrative engagement), but by the ways that particular practices are in circulation with others. (p. 64)

Ito makes a similar point in her chapter discussing the history of children’s software, noting that this history “emerged as an experimental media category, and its subsequent uptake by various social and political actors—including kids, parents, educators, and various commercial enterprises—is a microcosm for the social and cultural contestations surrounding new technology, children, and education” (p. 89). The story of technical and design

innovation to transform the conditions of learning and play is shared as a cautionary tale about the difficulties of reforming existing social and cultural structures even with the best of intentions and innovative new technologies.

Similarly, despite the range of perspectives offered, there is an implicit assumption carried on every page of this volume of a need to identify the kinds of questions not yet asked, the kinds of research not yet done—the failings, in other words—of the current approach to a field that is only now beginning to take shape. With regard to this point, there are a number of simple, yet often overlooked premises that have shaped the volume as a whole. I list them in abbreviated form here by way of quick introduction:

- Gaming can include interaction with nondigital media. While video games dominate the discourse around game-based learning, many qualities of games as learning systems are present in nondigital games as well, and many games take both digital and nondigital forms. Play across media is one way games are mobilized within everyday activity.²⁴
- The relationship between games and learning has a history that predates the advent of modern video games, including a rich history in the design of children’s software.
- Learning *about* games and learning *with* games take place simultaneously. One cannot learn about or from games without engaging in their play.
- There is no “one” game: the individual, social, and cultural motivations of any player affect what is experienced through play, and no two players ever experience the “same” game. This creates a challenge for those looking to games to provide a standardized context for learning.
- All play means something: games, like other forms of media, are systems of meaning that are read, interpreted, and performed by players.
- Players determine how they learn. The productivity of gaming environments lies in the fact that kids among themselves are free to figure out and create learning and teaching arrangements that work for them. So while it is important to understand how the qualities of games themselves support learning, it is equally critical to address how players take on active roles in determining how, when, and why they learn.

Through an emphasis on gaming-as-ecology I pushed the authors to explore the design and behavior of games *as systems* in which young people participate as gamers, producers, and learners. This systemic bias comes from my own status as a game designer who has theorized games in this way, and represents just one of many possible approaches. I acknowledge that there are limitations to this perspective, as there are with any that might be used. Similarly, while I tried to include as broad a range of topics as possible, there are obvious holes. Nowhere in the volume is there a chapter explicitly on video games and violence, nor one on *World of Warcraft* or *The Sims*, each representative of topics popular among the media and game scholars more generally. It is because of their popularity, in fact, that I decided to forgo their inclusion, in favor of less present voices and games. The historical time line included at the end of the volume gives an overview of the range of games referenced throughout; a great deal of ground was covered within the limitations of the series’ guidelines.

In addition, because the MacArthur series was conceived as a set of six related volumes, it was important to ensure that video games were represented in volumes outside of this one. Any argument made here to support a gaming ecology would be weakened if work on

gaming were exclusive to the “video game” volume. Happily, chapters like Douglas Thomas’s on *Diablo II* and the crafting of transnational identity and Henry Lowood’s on the political uses of machinima, for example, enrich their respective volumes.²⁵ This collection is certainly stronger for their parallel engagement.

Having kept each of these concerns in mind, I did my best to create a volume that supported complementary and contradictory perspectives without the weight of too much conceptual prejudice. In so doing, I hope the collection brings a more sophisticated and informed awareness of the meaning, significance, and practicalities of gaming in young people’s lives. This awareness does not presuppose that all effects are positive, nor does it assume that no challenges exist in transforming this knowledge into practical strategies. As Ito notes, “the problem of ‘using games to make learning fun’ cannot be addressed simply as a research or software design problem. Although . . . we may recognize the learning potential of games, this recognition alone does not change the structural conditions that insist on the bifurcation between entertainment and education and correlate only academic content with educational success” (p. 114). The challenges of overcoming these conditions are many and deep. I repeat *the challenges are many and deep*. It does posit, however, that gaming represents an ecology that is tangled up in a range of other ecologies—social, technological, economic, political—and that learning how to activate gaming as one node within a larger network holds promise for those willing to engage.

Litmus Test

I once saw game designer Will Wright give a talk in which he described two key moments that would occur during the demonstration of a new game with a group of players, if the game was well designed. He looked for these moments for they helped him to assess a game’s ability to engage players. Key moment Number One comes when a player unconsciously reaches for the game controller or mouse and asks, “Can I try?” This request reveals several things: the player is excited by the game and can’t wait to try it (the sooner this happens in the demo, the better!); the player understands what to do; and the player also feels confident in his or her ability to play. This last point is critical, for a player who lacks confidence will rarely choose to play, in the same way that a student who lacks confidence in his or her ability to read will tend to shy away from reading, and most certainly will refrain from demonstrating that ability in front of others. Key moment Number One requires *clarity* on the part of design.

Several authors in the volume address key moment Number One quite explicitly. Joseph’s “Why Johnny Can’t Fly” explores the implications of gaming within a youth development framework, arguing that the power of games to create numerous “Can I try?” moments is one reason his program, Global Kids, has seen success with gaming as a trigger for learning. Stevens, Satwicz, and McCarthy look at the range of kid-created learning arrangements that naturally embed support for such moments within a peer group, extending the design of the game to include the design of the environment in which it is played. And Pitaru, with his focus on allowing kids to act on their own ideas through independent or mediated play, notes that games do so in a way that improves a sense of self-reliance and self-esteem. In his case study of *Tetris*, he frames the question of “Can I try?” as a conduit for social inclusion. As Kate, an Occupational Therapist writes, “Even when a kid is playing a game at home, he’s actually participating indirectly with a social activity because that’s what they’ll be talking about tomorrow morning—eventually they will sit in front of the game together, eventually

the kid will be able to show what he's achieved through practice."²⁶ Thus "Can I try" is not only a marker of design success, but one of learning too.

Key moment Number Two arrives the moment a player turns to ask, "Can I save it?" This request records the moment that the player feels *invested* in the experience. Not only does he or she feel like the time spent playing is both valuable and meaningful, but he or she is anticipating playing again. Key moment Number Two can bring tears of joy to designers' eyes, for it means they have crafted an experience over which the player feels ownership. This sense of *productive* agency is a quality discussed by several authors within this volume—Gee, Ondrejka, Squire, and Joseph among them—as critical to gaming. Gee, for example, writes that

From a learning perspective, what is important about video games is not interactivity per se, but the fact that in many games players come to feel a sense of agency or ownership. . . . In good games, players feel that their actions and decisions—and not just the designers' actions and decisions—cocreate the world they are in and shape the experiences they are having. Their choices matter. What they do matters. (p. 35)

Much of this material is covered in other volumes in the series, so I won't duplicate it here, but what is clear is that—for this generation of kids—gaming as a productive literacy drives feelings of personal agency, affecting both life and thought. As Everett and Watkins posit, "empowering young people on the social and economic margins to create content not only diversifies what content they consume; it also holds the promise of expanding how they learn and reproduce race for public consumption for generations to come" (p. 160). What matters a great deal within this model of agency is the network of social creation and critical reflection it offers, and the community of collaboration, which results. Key moments One and Two are requirements of any good learning system, digital or otherwise. As a teacher I often measure the quality of my own instruction within this framework. Key moment Number Two requires *depth* on the part of design.

Although I only remember Will defining two key moments, I believe there is another equally important one, which grows out of the context of gaming as a socially embedded practice. Key moment Number Three occurs when a player turns to another and asks, "Want me to show you?" This form of learning may take place on a micro- or macroscale—one player to another or one player to thousands—but in each case there is an implicit understanding of a player's desire to teach another. Pitaru describes a scene between two wheelchair-bound adolescents playing a modified version of *Tetris* together:

Jonah had never played the game before, and Eric started explaining it to him. We did not intervene. This mentorship went on for over thirty minutes, with a growing sense of excitement. With every shape that fell into place Jonah became more visibly excited—occasionally turning around to us with a huge smile but mostly laughing audibly at the screen, at times shouting—"I love this!" Eric, who picked up on Jonah's joy, became even more motivated to provide Jonah with strategies. Despite the fact that it took Jonah a considerable amount of effort and time to operate the buttons, not once did Eric take over the controls. (p. 81)

Key moment Number Three requires support of *reflection* and *interpretation* on the part of designers.

And there is a fourth key moment as well. One metatheme that emerges again and again across chapters is the power peer-to-peer learning affords the evolution of a knowledge system, and the range of guises in which such learning is currently cloaked. Ondrejka points to moment Number Three's logical counterpart in his description of *Second Life*. "The 'Welcome Area' is often full of residents displaying their newest and most impressive creations. While

sometimes confusing to new arrivals, these displays provide a powerful demonstration . . . and often lead to the most critical of questions: ‘How did you do that?’” Key moments 1–4 infuse the ecology of gaming, creating feedback loops that cycle through levels of engagement, agency, mastery, expertise, and back again. Key moment Number Four requires support of a *community of practice* on the part of design.

So where does this emphasis on key moments get us? For me, these moments point to one of the most basic reasons that games are recognized, without reservation, by players as learning systems—*trust*. Players trust that the game system will teach them everything they need to know in order to play. When games don’t do this, players walk away. The term *system* refers not just to the game itself, but to the entire tool-set available to the player within a gaming practice, including FAQs or strategy guides, cheats, forums, and other players in and out of multiplayer settings. Unlike a cell phone, computer operating system, or set of directions from IKEA, a game has to communicate successfully to its players how to play, or it will, in some sense, fail to exist fully. A game without players is nothing more than a rule set. Significantly, this contract of trust represents a fundamental change in the way people relate to systems, particularly technological systems. Ask someone who has not grown up with games to play a game like *Super Mario Bros.* for the DS and he or she will spend the first thirty minutes pouring over the instruction book. Gamers know this is a waste of time since reading a line like “If Mario gets hit by an enemy when he’s not shell dashing, he’ll lose his shell and become Super Mario” means nothing out of context, which is the play of the game. Designers of cell phones, operating systems, and new learning spaces would do well to learn from games. When the stakes are so high, a system can’t afford not to teach.

Games invite learning through a reputation based on trust, which is being extended into kids’ attitudes toward technology more generally. Betty Hayes’s work around games as trajectories of IT expertise demonstrates that games can become pathways for players toward an interest in computer science and the mastery of skills in programming.²⁷ The efforts to engage more girls in the field of Computer Science, for example, have often involved the use of games—or game technology—to do so.²⁸ Yet, if it is important to try to grasp the impact and implications of games for a generation of kids that considers them a second skin, it is critical to understand better how players come to games in the first place, and the different pathways they take once games become a part of their lives. Technology may be one of those pathways as the distinction between technological spaces and gaming spaces continues to erode. What might be others?

Games are currently used by players/teachers/parents in many different ways. Games can function as doorways into specific content, offer an introduction to a specific skill set (learning probability by playing *Dungeons & Dragons*, for example), or operate as a node within a larger learning system, as is the case in science museums or libraries. Games can be used to occasion family interaction or to escape from the social fold. Squire’s work with *Civilization III* suggests that many kids use games as gateways toward the acquisition of new interests. Stevens, Satwicz, and McCarthy suggest that games offer kids pathways toward professional identities. But as both Everett and Watkins and Pitaru show, entry into a broad ecology of gaming is never a given. Many barriers to entry exist. As Nichole Pinkard notes:

Pathways into gaming is one question that I have been pondering lately as I attempt to figure out the role of game playing in our Digital Youth Afterschool Program. Our program serves a 99 percent African American audience of 6th through 9th graders who each have a laptop computer. I have been struck by the lack of MMOG game playing by our kids. Our kids play Xbox, Sega and Playstation but for the most part they use their laptops to create movies and music, to engage in social networking sites such as

MySpace, Tagged or view videos on YouTube. The students that play MMOGs such as *World of Warcraft*, are few and far between. What accounts for this reality especially in situations where the digital divide in relationship to access has been addressed? I hypothesize that our kids have not taken up MMOGs because they are not surrounded by peers or mentors who play MMOGs and can support them in their play.²⁹

Access to a network of both peers and mentors who can model what it might mean to participate in a gaming space affects kids' entry into games and learning. In the same way that kids need teachers to model effectively the activity of "being a good student," they need access to others actively engaged in communities of practice across gaming genres.

Envisioning a future that looks to pedagogies and practices drawn from games requires finding ways to provide models and mentors for those who have not had equal access to either. Helping teachers and parents learn how to take on such roles within a gaming context is equally critical. New platforms such as the Nintendo Wii, and games that invite intergenerational play, like *Animal Crossing*, *Karaoke Revolution*, and *World of Warcraft*, point to strategies for inclusion on this level. Other "triggers" into gaming exist as well. Phil Bell, in his group's study of everyday learning as it relates to science and technology, has found several complex and fascinating social contexts that provide reinforcing conditions initiating (and sustaining) the gaming that is present.

We have a Filipino mother and her fifth grade daughter who does a fair amount of Nintendo DS gaming. We have learned that there is an extended parenting network of sorts—made up of four sets of formal godparents and a handful of additional adults that go by the honorary title of "aunt" and "uncle"—who regularly interact with the daughter on specific domains or interests. They describe it as being common in Filipino culture. One godmother helps the girl with her math learning. Another is actually her "technology godmother"—who bought her the DS and her cell phone—so that the girl can have access and learn how to use technology. This strikes us as a fascinating social organization where adults with particular interests/backgrounds/resources can serve as targeted learning brokers for the children.³⁰

While it is true that many kids game, it is not true of all kids, and certainly not true of those who have been looked to in the past to lead their education. It is also true that teachers and other school personnel have very few resources for bringing gaming (and many other everyday activities) into school, and so it is very difficult to create policies that make sensible use of digital media. It is not yet clear what routes to policy change will be the most effective, but it is an area that must be engaged if any real difference is to be made.

Conclusion

If, as Jonathan Letham writes, "a time is marked not so much by ideas that are argued about as by ideas that are taken for granted," then we must look closely at what is not new, or seemingly new, in the arguments we make.³¹ What is it that we purport to know? We know, for example, that play is iterative as is good learning, and that gaming is a practice rooted in reflection in action, which is also a quality of good learning. We know games are more than contexts for the production of fun and deliver just-in-time learning, the development of specialist language, and experimentation with identity and point of view. We know games are procedurally based systems embedded within robust communities of practice. We know that video games and gaming have done much to shape our understanding and misunderstanding of the post-Nintendo generation, and hold a key place in the minds of those looking to empower educators and learners. Beyond their value as entertainment

media, games and game modification are currently key entry points for many young people into productive literacies, social communities, and digitally rich identities. This we know, and yet history seems slow.

It seems slow because, despite our desire to change the way kids think and learn, we are bound constantly by old tensions—tensions in distinction between the real and the virtual, in school and out of school, formal and informal, learning and teaching, knowing and being. We are bound by old thinking that says what is new here is the games, when what is new is the attitude and tools of the players. We are bound by believing that to understand the meanings of game play we can simply look at the rules when we, in fact, need to look at players' performance and understand *their* understandings of them.³²

Increasingly, we are bound by a failure to see that a game is not a commodity but a *gift*, a thing not gotten by our own efforts, but something given and received freely. This is not to say that no money is exchanged nor effort exerted, but rather that the game defines itself not by this transaction, but by the contract it establishes with players when they accept its rule set and enter into the space of play. We see players take on the burden of learning so easily; a game makes a connection. But it, like a gift, has demands too, for its giving is not unconditional. A game demands that something be given back, that players do their very best to receive increasing levels of challenge and to succeed. A game desires to be played, to be shared, to be critiqued. It demands that players compete, exploit any weakness, and teach others how to do the same. A game demands, finally, that it be beaten, so that it may be given as a gift to another. It is here, then, in the name of a gift, that games will help us change.

The gift of this volume is in the many questions it leaves unanswered, providing new pathways for work in the field.

- a. In what ways are games and gaming shaping kids' lives? How are they shaping, misshaping, or transforming kids' approach to learning?
- b. What forms of knowledge, literacy, and social organization are being supported by a broad ecology of gaming?
- c. What forms of learning do we see emerging from the specific qualities of games (i.e., their status as play experiences, procedural systems, interactive and visual systems, etc.)? Which forms are emerging from the qualities, characteristics, and social practices of digital media more generally? And which from players' status as kids?
- d. Are video games presenting new pedagogies to be explored and developed? Are video games employing existing pedagogy, but in an unfamiliar context? Are video games transforming or reinterpreting old pedagogies into new forms?
- e. What strategies have we missed that might validate, exemplify, or discount connections between video games and learning? Is there a fundamental difference, for example, in the way kids game? If so, what are those differences, and why do they matter to a larger discussion around games and learning?

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@article{Bronfenbrenner1977TowardAE, title={Toward an experimental ecology of human development.}, author={U. Bronfenbrenner}, journal={American Psychologist}, year={1977}, volume={32}, pages={513-531} }. U. Bronfenbrenner. Published 1977. Sociology. American Psychologist. A broader approach to research in human development is proposed that focuses on the progressive accommodation, throughout the life span, between the growing human organism and the changing environments in which it actually lives and grows. A preliminary study of some ecological correlates of child abuse: the impact of socioeconomic stress on mothers. J. Garbarino. Psychology, Medicine. Citation: Salen, Katie. "Toward an Ecology of Gaming." *The Ecology of Games: Connecting Youth, Games, and Learning*. Edited by Katie Salen. The John D. and Catherine T. MacArthur Foundation Series on Digital Media and Learning. This breadth comes both from an attempt to map gaming as an ecology of concerns drawn from a range of contexts and from a series of disciplinary perspectives. Contributors come from education, the learning sciences, film studies, technology, anthropology, game design, performance studies, computer science, and youth development. Both material culture studies and ecological anthropology are concerned with the material conditions of social and cultural life. Yet despite advances in each of these fields, the circulations of materials on which life depends. To overcome these limitations, the review proposes an ecology of materials that focuses on their enrollment in form-making processes. It concludes with some observations on materials, mind, and time. Suggested Citation: Suggested Citation. Ingold, Tim, "Toward an Ecology of Materials" (October 2012). *Annual Review of Anthropology*, Vol. 41, pp. 427-442, 2012, Available at SSRN: <https://ssrn.com/abstract=2158248> or <http://dx.doi.org/10.1146/annurev-anthro-081309-145920>. Tim Ingold (Contact Author).