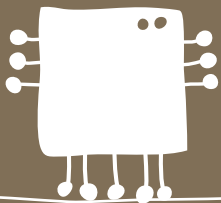


December
2009

Can Video Games Promote Intergenerational Play & Literacy Learning?

Report from a Research &
Design Workshop



Cynthia Chiong, Ph.D.

The Joan Ganz Cooney Center at Sesame Workshop

contents

- ③ overview
- ⑤ the special role of public media in addressing america's literacy challenges
- ⑧ **special section**
wii are family:
findings from exploratory research
- ⑭ key issues with intergenerational game play
- ⑰ design principles
- ⑲ games ideas
- ⑳ next steps
- ㉒ conclusion
- ㉓ **appendix a:**
meeting participants
- ㉕ **appendix b:**
intergenerational play & literacy
design workshop agenda
- ㉗ **appendix c:**
intergenerational digital learning concept
paper: can video games help close the
literacy gap in the other america?
- ㉙ **appendix d:**
intergenerational video game literature review
- ㉛ references

overview: exploring the potential of intergenerational play

On July 30, 2009, the Game Innovation Lab at the University of Southern California, the University of Michigan School of Education and Learning Sciences, and the Joan Ganz Cooney Center at Sesame Workshop, with the support of the Corporation for Public Broadcasting, convened a workshop in which experts in cognition, developmental psychology, educational technology, and game design discussed and developed strategies to use intergenerational play to accelerate learning for children who are struggling to master literacy skills in the primary grades. (The meeting participants and an agenda appear in Appendix A and B, respectively.) The meeting took place at the USC School of Cinematic Arts in Los Angeles.

Participants in the workshop noted that there has been a long tradition of encouraging co-viewing and intergenerational interaction with television, pioneered by Sesame Workshop and other high quality educational media programs such as *Blues Clues*. *Sesame Street* was intentionally designed to appeal to multiple generations, with the use of engaging humor and cultural icons to help deliver educational impact. The prospect that educational media can advance family learning and interaction has been influential over the past four decades. However, with the movement of approximately two-thirds of all mothers with young children into the workforce over this time period, the growing stresses in American family life, and innovations in the media sector as contributing factors, children are now often engaged with media by themselves, at earlier ages, and for longer periods of time. These trends are confirmed by survey data collected by the Kaiser Family Foundation (2005) and Michael Cohen Group (2007).

A central question for workshop conferees was: Can digital media such as games offer an important new opportunity to mediate and support

adult-child interaction? Parents and caregivers of young children are important “gatekeepers,” with great influence in shaping the types of media experiences their children will have. They are also “facilitators,” explaining information that children may not understand on their own. Finally, they are “educators,” extending and elaborating on the relevant information that is communicated (Fisch, 2004). Research has shown that parental guidance, or what educators call “scaffolding,” can improve young children’s learning of high quality media’s educational content, promote general language development, and engagement in relevant activities (see Fisch, 2004 for review). Given the effect parents and other adults can have on young children’s learning, and the need for major improvements in the performance of low-income children on key literacy benchmarks, the workshop focused on ways to leverage the “intergenerational” potential of digital media.

A challenge posed by the workshop organizers was how to take advantage of a relatively new phenomenon: recent data from Nielsen (2009) indicates that over one-half of adults play videogames and fully three-quarters of children are now gamers. The introduction of new platforms such as the Nintendo Wii has led to anecdotal observation of intergenerational game play, ranging from special family game nights in churches and synagogues to “bowling leagues.” Observers such as James Paul Gee, the noted literacy and digital media expert, have postulated that video games may be the next “it” platform for educational interactions. Given the active, “learn by doing” nature of video games, these digital media possess qualities that may uniquely position them as -a tool in teaching (see Appendix D for a research review). Thus the focus of the workshop was

to establish principles for conceptualizing, prototyping, and developing a line of educational, intergenerational games.

To help guide the proceedings, USC, the University of Michigan, and the Cooney Center developed background materials and presented research findings and mini-papers by leaders from a multi-disciplinary perspective including:

- Original field research on adult-child play patterns among middle- income and low-income families in New York City and Los Angeles.
- A Concept Paper and Literature Review on related findings in child and family development research. (See Appendix C and D, respectively.)
- Mini-papers from learning and play experts from different sectors. The mini-papers addressed key issues in family use of video games and digital media, global differences in technology access and video game usage, and marketing and financial sustainability considerations. (See Appendix E, which may be downloaded from www.joanganzcooney-center.org.)

Guided by the background materials and workshop presentations, the following essential questions were considered:

- Can intergenerational uses of digital media be better established?
- Can under-served children from different ethno-cultural and low-income backgrounds benefit from goal-oriented game play, and under which circumstances?
- How can digital media address fundamental learning gaps?
- How can the interest of both older and younger generations be sustained, especially in an educational context?
- What lessons can we learn from existing video games and digital media in terms of appeal and marketing?

The discussion generated much interest in collaborative work on a line of research and development in intergenerational, literacy-based, video game properties. Progress was made towards identifying the most appropriate audience, content, and platform. The participants generated key ideas that provide insight for both the design principles for educational intergenerational digital media and related research on their impact. An action agenda for follow-up appears as the last section of this summary report.

the special role of public media in addressing america's literacy challenges

In their opening remarks, Gary E. Knell, CEO of Sesame Workshop and Susan Zelman, Senior Vice President and Chief Advisor for Education Policy for the Corporation for Public Broadcasting, stressed the importance of the multi-sector composition of the workshop. Experts with distinct expertise in research, production, program design, distribution, and entertainment are too rarely convened to solve difficult educational challenges. They noted the potential for breakthroughs from the group, and urged ongoing collaboration.

Given funding opportunities such as the United States Department of Education's Ready to Learn initiative (RTL), and new innovation funding available from the public sector and private philanthropies, the field may be especially ripe for the development of digital games. RTL specifically seeks to develop engaging, well-researched, resources for both preschool and primary grades children and adults to help build reading skills, with an emphasis on reaching low-income families.

A National Challenge: Addressing the Fourth Grade Literacy Slump

In opening remarks, Susan Zelman stated that substantial progress in the next five years on addressing stubborn educational achievement gaps is essential and possible. In envisioning a brighter future, she noted two of the more crucial concerns in American education: what was originally coined by Jeanne Chall of Harvard University as the "fourth-grade slump" in reading achievement (Chall, 1990), and the achievement gap between students from middle income and low-income families (see Appendix D for review). The 4th grade slump refers to the difficulty students have in transitioning from knowing the essential skills needed to learn to read, with a focus on letter recognition and pho-

tics, to becoming fluent readers, with a focus on comprehension and content mastery. By the fourth grade, the majority of low-income and minority students, according to results from the National Assessment of Educational Progress (NAEP), experience major difficulties in reading proficiency, especially in comparison to their higher income peers. It is critical to provide additional support to students prior to fourth grade. Accordingly, 6 to 9-year-olds were identified as the appropriate age group to focus on for new literacy game design work.

Gary Knell briefly reviewed the educational track record of *Sesame Street* as a model to emulate, citing consistent research on the progress children who watch the program make in developing essential school readiness skills. Sesame Workshop is now developing a more robust "360-degree literacy learning" approach to engage children and families across media platforms ranging from the internet to mobile and games-based learning. He cited the revival of *The Electric Company*, for primary grades children in 2009 as a comprehensive effort to help address early reading failure and to prevent the "fourth grade slump." The new program features a highly interactive website, research-based games and community outreach activities in target markets, all supported by CPB and the US Department of Education.

Parental involvement in literacy development

Parental involvement can provide extra support that young children need, particularly in book reading settings (see Literature Review, Appendix D). However, research has also found that there are differences in the quality of parent-child interactions between middle- and low-income families. Ellen Newman from the University of Michigan presented three areas of

difference that she and her colleague Susan B. Neuman have documented in their pioneering field research on families:

- **Motherese/Parentese effect:**

Middle SES parents are more likely to communicate with their child in a “sing-songy,” slow, and deliberate manner than low SES parents. This type of communication is thought to be beneficial to a child’s language development.

- **The distancing effect:** Middle SES parents are more likely to extend the conversation from concrete to abstract levels than low SES parents. High levels of conceptualization help comprehension and generalization of knowledge.

- **Concerted cultivation v. the accomplishment of natural growth:** According to Lareau (2003), middle SES parents are more likely to cultivate a child’s interests and talents whereas low SES parents stress the accomplishment of natural growth. Active encouragement is likely to be more beneficial to a child’s potential achievements.

The research presentation sparked participant discussion of what the fundamental difference is between families of different SES, and of varying ethno-cultural backgrounds. Although the type of interactions in some low SES families may not accelerate language development as much as within middle class families, low SES and ethnic minority children may have stronger family ties and respect for parental authority than middle SES children (Lareau, 2003).

The discussion focused on the fact that low-income children are learning from *their adult interactions*, but that the background knowledge, skills, and perspectives they are often exposed to are not preparing many for the demands of schools today. The discussion focused on making the goal of informal education experiences a rich and useful “scaffold” for low-income parents and other concerned adults to add to their daily interactions. One participant reflected that our goal

in designing literacy-oriented educational media should not be to “bridge the gap,” but rather to help bring the bottom up.

Research conducted by early childhood and technology experts further demonstrates that a response to the reading slump and educational equity concerns cannot simply focus on resources. Neuman and Celano’s (2006) research on families and libraries offers important insights. In their research, low SES families visited libraries just as often as middle SES families, despite there being fewer resources in the libraries. However, the type of interaction between parents and children once again differed. Low SES parents left their child alone to explore the library, whereas middle SES parents guided the experience. Participants questioned whether this difference was due to low SES parents’ lack of confidence in elevating their child’s library experience versus a simple lack of interest. Some researchers believe that these parents aren’t playing as active a role in mediating their children’s online experiences at the library because they realize that their children are savvy enough with computers, and should just stay out of the way. However, it is true that children may be savvy with computers, but they may not be effectively using computers to help them learn. Neuman and Celano also found that although low SES children were adept at searching for information on the internet, the information they searched for differed from middle SES children. Low SES children looked up sites with pictures and barely any print, whereas middle SES children engaged with print-heavy sites.

If it is the case that low SES parents lack confidence in their ability to help with the content, digital media may be an appropriate platform for encouraging parental involvement because it can provide additional guidance some parents may need for effective teaching/learning interactions. Research has shown that with guidance, low SES parents can learn how to effectively interact with their child in a

learning setting (see Literature Review, Appendix D). Digital media can provide this type of training within the game itself. However, little is known about how parents and their children interact during digital media game play.

special section

wii are family: findings from exploratory research

To inform the design of an intergenerational video game, the EA Game Innovation Lab at USC and the Joan Ganz Cooney Center observed 26 pairs of parents and children engage in game play. Results of this research were shared at the July workshop. Under the direction of Tracy Fullerton, the USC team studied 15 middle-income dyads from the Los Angeles area, and the Cooney Center's Dixie Ching and Cynthia Chiong studied 11 low-income pairs in New York City. Key questions of this inquiry included:

- What behaviors are associated with intergenerational game play?
- What player dynamics will attract parents and children to play?
- Which platforms and play mechanics best support intergenerational engagement?

The parent-child dyads participated in three 10-15 minute game play sessions: the first session was with a board game, the second was with a video game on a console platform such as the Nintendo Wii, and in the third session dyads could choose between a board game or video game. The pairs were also given a pre- and post- interview. Specific behaviors and interactions both in- and out- of game play were coded into general trends around teaching or sharing of knowledge, discussion about the game play and levels of engagement with each other and/or the game. While the small sample size makes the following findings illustrative rather than conclusive, the dyad analysis resulted in the following observations by the study team.

The games

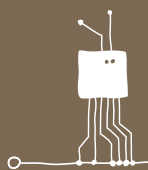
Table 1 displays the complete list of games used for this study. It also provides general characteristics of each game.

!

Table 1

	Adult appeal	Child appeal	Toy/Activity	Game	Objective-based	"sandbox"	Single-player	Cooperative	Competitive	Physical	Digital	
Guess Who												Competitive, deductive reasoning
WiiSports												Motion-based mini games
Uno Stack												Physical dexterity with strategy
Hungry Hungry Hippos												Physical game with high level of chance
LEGO Star Wars												3D action-adventure, cooperative
LEGOs												Building, sandbox play
Animal Crossing												Exploration and collection game
Mario Galaxy												3D platformer
Mario Party												Mini-game compilation
Mario Kart												Racing
NY Fashion Designer												Strategy with girl-focused dramatic element
Flower												3D motion game with non-traditional dramatic content
Sorry												Traditional board game with high level of chance
Connect Four												Strategic two-player game
Operation												Physical dexterity game
Dominoes												Traditional strategic board game

Games were chosen so that there was an even split between physical and digital games with options that would appeal to adults in both categories. Beyond that requirement, we tried to hit different over-arching genres and play styles in family-friendly games.





PRO-SOCIAL TRENDS	ASOCIAL TRENDS
Child explains game to parent	Parent and child have trouble understanding games
Parent asks child questions - seeking info	Child defies/deflects parental control, calling it too much
Parent asks child questions - testing grasp of knowledge	Parent does not respond to child's questions or requests for help
Parent compliments child's actions	Child takes controller back from parent
Parent makes child count steps out loud	

Pro-social vs. asocial

Chiong and Ching found that with physical and board games, the parents took a guiding role more often, gave more positive feedback and discussed strategic options. With digital games, the children were more likely to be the “authority” and the parents asked more questions regarding game mechanics.

Games that elicited the most pro-social behavior included Sorry, Connect Four and LEGO Star Wars. The types of game mechanics that provoked these behaviors were turn taking and strategy, occurring most often in games that required the use of skills like counting and reading. In about half the dyads, parents used the slow pace of turn-based board games to give encouragement or teach strategic thinking. However, in the other half of the dyads, parents did not provide any kind of guidance. While these games did provide opportunity for parents to directly guide children's choices, they did not prompt parents to use these skills.

Most of the asocial behaviors took place during video game play where there were long bouts of silence and the children were at times unresponsive to the parent's comments or questions. Also, in games such as Connect Four, as noted above,

some parents took no initiative to mentor children, resulting in low engagement and silence.

Game choice

In general, the parents allowed their child to choose the game in the third play session. The parents often narrowed down the list and then the child made the final decision. However, there may be a difference between the middle and low SES parents in that the low SES parents were more likely to choose a game themselves. When the parents actually chose the game, it was generally a strategy-based game. Both parent and child took into consideration what the other player would enjoy. Gender also played a factor in game choice for fathers, who most often chose to play strategy games such as Connect Four with sons and the highly gender-specific Fashion Designer with daughters. Mothers, interestingly, did not vary in choice between sons and daughters, but most often chose to play physical games such as Hungry Hungry Hippos and Wii Sports with their children. Other factors that affect game choice are level of familiarity and availability of time, with most pairs choosing familiar games and games of shorter duration. Games that had long rule sets were often abandoned immediately in favor of a more familiar game.

Rules of the game

Much of the interaction between the dyads involved learning the rules of the game. This is a potentially collaborative experience, and when both parties were equally engaged, provoked significant pro-social behaviors such as reading together and parents complimenting children on understanding rules. Obviously, following the rules together is a pro-social behavior; however, it was also found that breaking the rules can create another kind of pro-social engagement. Some parents responded negatively, but with discussion. A few parents responded positively, interpreting the rule breaking as a playful occurrence. Some workshop participants drew parallels to the discovery of “cheat codes” by children in video game play. In general, rules of well-known games were more firmly upheld by parents, while physical games or those with less clearly known rules were treated as “okay” to break by parents.

Competition

In general, parents in the study were not competitive with their children; however children were very competitive in games in which they assumed more skill. This is an area where the low and middle SES parents differed. Low SES parents in this sample were more likely to be competitive with their child than middle SES parents. The children in both low and middle SES families were fairly self-aware in that they were only competitive when they knew they were good at a specific game. Participants in the workshop wondered how cooperative or creative play might change the interaction and if it would be a better format for an intergenerational game.

Mentoring opportunities

With board games, the parents generally provided necessary guidance such as explaining the rules and providing strategic advice. In contrast, with video games, the parents were not able to provide the same level of guidance due to unfamiliarity with the games, lack of confidence, the pressures of real-time play, and their difficulty in mastering use of controllers. In turn, the

children had to take on more of a mentoring role by demonstrating how to use the controller and explaining how to play the game. Not surprisingly the research documented that children are usually more adept at video games than their parents. However, they were less successful than their parents in a mentoring role, often giving fleeting responses and even ignoring their parents’ questions or comments. Participants in the workshop discussed how supportive game designs could offer rewards that would encourage children to help their parents play.

Influence of game type

Strategy games tended to favor parental engagement whereas physical games tended to favor child engagement. This is likely due to familiarity as parents are more familiar with gaming strategies and children are better at maneuvering controls. The children were also more engaged than their parents in games that require a certain level of pretend play. Games of chance present an even playing field. Finally, games that seemed to be the most engaging to both parent and child were physical/tactile games such as Wii Sports, LEGOs, and Hungry Hungry Hippos. Participants in the workshop stressed the need to “level the playing field” between child and parent for both to stay engaged in a video game. Factors that may have this effect include designing easy-to-use controllers or eliminating them all together, and providing a narrative to keep both parties engaged, especially with imaginative games.

Focus of the interaction

Parent-child behavior in the study settings demonstrated an imbalanced interaction pattern. The parents generally focused on interacting with their children while the children focused on interacting with the game. Thus, the parents were less focused on the game than the children and the children were less focused on their parents. The participants in the workshop discussed how to address this fascinating role tension. Is it possible to take away the “third” party, meaning the screen and/or controller?

They noted that a positive aspect of board games is the turn-taking, face-to-face nature. How can we replicate this type of reciprocity in a video game?

Mutual engagement

Games that elicited high degrees of engagement for both parents and children tended toward the physical and tactile, such as Wii Sports, Hungry Hungry Hippos, LEGOs, and Mario Kart. Some of these, such as Wii Sports and LEGOs also prompted high degrees of interpersonal engagement between the players as well. This may be because, as noted above, the physical and chance based mechanics of these games offer a more level playing field. They also tend to be shorter games, with easy to master controls and playful, lighthearted themes and characters.

Summary of research

The study provides preliminary evidence that games can be a good platform for intergenerational interaction. Existing game mechanics already provide opportunity for parent-child interaction and mentorship. However, these mechanics are not being fully utilized in current games to engage parents and children in a mutually rewarding, potentially enriching play experience. To create successful intergenerational video games, many issues will need to be addressed. Two key issues for further inquiry are:

Understanding the way in which more successful mechanics and play patterns from traditional games may be taken advantage of in the context of intergenerational video games, including “teachable moments” for both parents and children.

Addressing the natural tension or “power struggle” between the parent, child, and game in order to create a successful intergenerational experience that allows a balance of focus and rewarding experiences for both participants.

Areas of potential focus that have been generated by the study include physical/tactile or chance-based games, both competitive and cooperative, such as LEGOs, Wii Sports, and Hungry Hungry Hippos in which the level playing field creates equal engagement for both parent and child. In addition to this are turn based strategy mechanics that provide natural opportunities for parental guidance. While these might at first seem like diverse design trajectories, it is likely that a successful intergenerational video game will include aspects of these existing play patterns.

key issues with intergenerational game play

In responding to the workshop organizers' challenge to create a fun and engaging line of intergenerational games with significant educational value, the participants discussed other key issues.

Family use of video games and digital media

Who. "The family" differs across cultures and often by income status. Nichole Pinkard from the University of Chicago and others discussed how some families, especially low SES families, interact with extended family in their daily lives. Aunts, older siblings, and grandparents are often caretakers for the younger members of the family. There are also very young parents and even very young grandparents. Howard Byck of the American Association of Retired Persons pointed out that the average age of "grandparenthood" in the United States is 47, thus more and more of these elders are becoming adept at various forms of game play, including digital games based on their own exposure to new technologies as they grew up and became parents. (For a review of research on grandparent-child communication patterns, see paper by Jake Harwood in Appendix E, www.joangan-zcooneycenter.org). With the varying ages of caregivers, there are also varying levels of expertise and interest in digital media. Furthermore, the mentor/mentee relationship may differ based on the different interests and competencies of the adult involved.

On the other hand, there are families where extended family may live far away. In this case, video games may be a way to connect them. Jake Harwood's paper speculates on how this may be especially beneficial for grandparents who do not see their grandchildren often. Video games can allow for remote connections via the internet and also provide a motivation for children to

visit. They can benefit older adults as a means to practice their physical coordination and as a new source of social engagement. Thus, media developers need to consider older members of the family and their potential interest in using an intergenerational game.

How. To design a game, especially an educational game for young children, it is important to ensure that the game is developmentally appropriate. Fran Blumberg of Fordham University presented two key factors to consider:

- **Formal features:** This refers to the auditory and visual production and editing techniques. If developmentally appropriate, these features effectively draw children's attention to the relevant screen information and also facilitate the coding of that information.
- **Interactivity:** This refers to how the game itself can be customized and provides a level of control. The game decides when to present certain information and feedback. In a way, the game is providing a level of scaffolding for the child.

Although attending to such considerations may facilitate learning for the child, the process may not address the needs of different ages. More research is needed to align goals across audiences.

What. What keeps children interested in new media? Based on observational research on adolescents and 'tweens in the United States, Heather Horst of the University of California, Irvine discussed two genres of media participation that she and Mimi Ito have observed.

- **Friendship-driven:** Children are involved in activities with their friends and peers through school, religion, sports, and other community environments. Social networks such as MySpace and Facebook may be considered friendship-driven.

- Interest-driven: Children engage with others because of shared interests and passions such as fashion, dinosaurs, or video games.

Interest-driven participation is less prevalent than friendship-driven participation. However, an intergenerational video game would ideally target interest-driven participation.

All of these factors lead inevitably to the question of how to engage *both* child and caregiver? The participants discussed the following:

- Humor: Encouraging laughter is the #1 way to promote social engagement. Many current family shows and movies include humor for both child and parent.
- Ground the game in real world interests: Studies show that the topic must be meaningful in order for the player to invest time and commitment. The opposite of play is not work, it is boredom. Therefore, the game needs to elicit passion.
- Alternate reality links: An emerging trend in current games is combining digital media with real life.
- Diverse perspectives are valued: The game does not have to be one size fits all.

Cultural perspectives

A main factor of concern about digital media use across different cultures and communities is accessibility and relevance. Richard Beckwith of Intel presented evidence of how communities in rural and undeveloped countries such as China, India, and the U.S. express interest in gaming and technology. Traditions of play vary greatly among sub-cultural groups, and as digital technologies evolve, it is important to support locally created forms of experimentation that are “tuned in” to local milieu and sensitivities.

Technology infrastructure

Joaquin Alvarado suggested that a major emphasis on community technology infrastructure could make a “digital lightpath” possible if family game developers had access

to the proper cable fiber and programming platforms. Thus, it is important to consider the best platforms for widespread usage and experimentation. Mobile phones are fast becoming the most prevalent form of digital platform, and could become an important bridge between home and formal learning settings where computers are less prevalent, especially in low-income communities due to costs and space. However, game consoles may be a good compromise as they can be considerably less expensive than computers and take up less space (see paper by Richard Beckwith in Appendix E, www.joanganzcooneycenter.org).

Marketing and sustainability

Marketing factors need to be considered early in the process of creating sustainable game properties. Alan Gershenfeld, Co-Founder of E-line Ventures discussed how as foundations, non-profits, universities, and the government continue creating more digital media properties with intentional educational value, they need to shift from “accidental” to “effective” publishers. In order to develop an effective publishing strategy, the field must ask:

- Who is the target audience and what is the desired impact?
- What is the best game platform and genre to reach this audience?
- What are the financial requirements and expectations of the project?
- What is the competitive landscape and is there market demand?
- Who is the most effective team to develop the game?
- How will the game be supported once released?
- What is the methodology and plan for assessment?

Marketing considerations may not only help lead to a successful distribution, but also help encourage intergenerational interactions. An example of a product segment with high market penetration that is influencing intergenerational interaction is smart phones. According to

Brendan Boyle of IDEO, a design firm whose expertise includes interaction design with mobile devices and game play, there are three key stages of “sharing” with smart phones like the iPhone in families with young children:

- Honeymoon: New delightful toy for owner’s use.
- Making connections: Shift from exploring phone by oneself to exploring family ties and sharing with others. Moms share with their child more than dads, and they share only when the child is within eyesight.
- Accessing the gimmicks: Making use of applications is typically not aimed at children, but these are captivating to children. The tremendous popularity of new software for smart phones is an important design opportunity that can connect technology to real life.

Many of the new applications create “lean in/lean out” moments that can be very effective learning opportunities for multiple generations to share. For example, a child can create a drawing using a phone application. He or she “leans in” to create the drawing and “leans out” to share it with others.

design principles

A main goal of the meeting and the overall collaboration between USC, the University of Michigan, and the Joan Ganz Cooney Center was to develop guidelines for creating an intergenerational video game. Participants broke into small groups, in which they generated the following design principles to guide further research, development, and distribution:

Mobility and casualness

The importance of “meeting players where they are” brought the principles of mobility and short, casual play to the forefront in many of the group discussions. The ability for parents and/or children to “trigger” game play at available moments was considered critical to promoting intergenerational play. The play itself would need to be “chunkable” in this case – i.e. able to be turned on and off easily, with the state saved or the session so short that state did not matter.

Build on natural learning opportunities

Groups discussed the potential for creating game mechanics that build on daily activities or existing parent-child interactions as a jumping off point for learning. For example, games that integrate family cooking time or bedtime stories into the play situation were considered. One of the benefits of this type of design concept is that the focus of both parents and children are already on each other, thereby addressing some of the issues found with the role tension between parents, child, and the game object.

Teach or model the practice of scaffolding

An important design principle for intergenerational play is the integration of game mechanics that teach parents how to teach, guide, and support children’s learning. For example, games might give parents extra messages on how to help their children with vocabulary words used

within the game play. Making use of these tips would be rewarded, and help both parents and children to move forward in the game.

Stay domain-free

A potential design principle is to build game mechanics that are flexible enough to accommodate domains of interest to both parent and child. For example, some children might be interested in music, while others love basketball. Some parents know a lot about woodworking, while others know a lot about gardening. Rather than focus on a specific subject area, allow the mechanics to be customized to each players’ interest.

Allow asymmetrical/asynchronous play

Parents (and other caregiving adults) and children are often times not in the same location at the same time. When they are, it is often the case that one is engaged in another activity. A game could encourage intergenerational participation if it did not require both to participate simultaneously. Furthermore, the game could play to the time constraints of each party, requiring much more of a time investment by the child than the parent, for example. It is possible to envision an intergenerational game in which the parent never directly interacts with the game, but the child is encouraged to find help by asking questions (and encouraging communication between parent and child in the process).

Create a socially desirable reward system

Much like the Presidential Fitness Test, a socially desirable reward system would not only encourage players to do better, but help parents justify their time spent participating in the game. Tying the reward system of the game into some kind of desirable social capital, such as a presidential award for literacy could help create the kind of

behavior change needed to make interacting and mentoring with ones' children a priority for busy parents.

Participants also contemplated how game-based equivalents to “refrigerator moments” (where family art work and other personal effects are displayed) could be designed to showcase and recognize children’s progress in learning games. Perhaps a digital analog to achievements that occur in more tangible mediums--such as drawings, paintings, or paper tests--that can connect parents to what their children are achieving within learning games could further engage and motivate children.

The small groups also brainstormed how to factor successful marketing and available “teachable moments” and settings into an educational game. Some of the ideas shared included:

- Incorporate the game into everyday opportunities such as gym class or bedtime.
- Utilize existing popular games such as *Guitar Hero*, *Pokemon*, *Hannah Montana’s Dress Up* games, *Barbie’s Digital World* and others to extend educational game play.
- Create a public database with standardized ratings of the games. This would inform parents of what’s out there and designers of what elements are important to include in their games.
- Incentivize collaborations between the public and private sectors. Since most educational games are less popular than ones mass marketed for family entertainment, could foundations, CPB, and other government agencies invest in new forms of collaboration?

games ideas

In addition to these design principles, the breakout groups also discussed specific game ideas and literacy building strategies, including:

“Literacy Inside”

One group promoted the concept of a set of literacy standards which would allow products of all kinds to receive a “Literacy Inside” rating stamp making them advantageous for parents to purchase for their children. This imprimatur would include media, such as games, books, and television programs, but also products like cereal or beverages that contained a measurably high-literacy level in their packaging or use. For this discussion, the group focused on the way in which “Literacy Inside” might work for video games. The group suggested features such as requiring active reading: not allowing players to just skip the text, but requiring active choice to move on in the game. The group called for adding literacy-based achievements, similar to Xbox Live achievements, but based on completing literacy tasks in the game. These tasks and features would be added by game designers interested in getting a high rating of “Literacy Inside.” Much like the concept of creating a socially desirable reward structure discussed above, this program could create awareness and desire for these products on the part of parents, and in turn, incentives for game designers to include literacy features in their products.

Corporation for Public Educational Gaming

Another group called for the establishment of a public-private partnership such as a Corporation for Public Educational Gaming was articulated as a national digital distribution portal, where teachers, students, and caregivers would have access to resources in order to better manage and track the literacy and learning needs and goals of individual students. This innovation “hub” would consolidate educational

games along with other resources such as downloadable books. The portal would help “change the model” of the learning in numerous ways. It would help open the schoolhouse door and engage the family unit more, create a more data driven system, and establish a pedagogy for games. In suggesting how a portal could consolidate educational games, the models of the Apple’s iTunes App Store and the Sony PlayStation Network were helpful analogues. This initiative would be part of a broader, coordinated national strategy to use public-private partnerships and digital media to help “reinvent learning in America.”

Rethinking physical education

One discussion group proposed a re-design of the physical education (PE) or gym class as a perfect opportunity to engage the curiosity of youthful minds and encourage physical play, while intersecting other subjects such as literacy, math, science, civics, and the arts. Schools can involve teachers, classmates, coaches, parents, and siblings through fun, participatory physical games driven by a storyline that offers the opportunity for users to connect the narrative to real world events. The goal would be to create a physical game that integrates popular culture and literacy skills that can involve the whole family, with models such as Fantasy Football and *American Idol*. These games offer a meta-narrative experience that can provide a through line for the child and extended family, creating a “movement and not a market” to raise healthy young individuals with aspirations to connect and engage with the world around them.

Game design contest

To extend the principles of participatory design to this challenge, one group generated the concept for a national intergenerational design contest for the best board game design that

reinforces basic literacy skills. The challenge itself would include required vocabulary and skills to be used in the game, making both the design process and the play of the final games a learning situation. Free prototyping kits would be distributed to parents and children, giving structure to the exercise, and requiring guidance from their parents to fulfill all of the goals. Entries would be available for play online, potentially even distributed commercially, and winners would be rewarded substantial prizes.

Good night games

Building on the assumption that games that take advantage of natural moments of parent-child interaction and on the “Literacy Inside” concept, one group proposed the idea of “wind-down” games to be played at bedtime. These games would incorporate the existing ritual of bedtime stories by being episodic in structure, with narrative-focused play that emphasizes creative story building. One idea was a world in which words had creative power and are resources for the players to find and use. If a player found the word “red” hanging from a tree, they could pick it and use it later to turn something else red. More advanced words and phrases would require help from parents, and would result in more magical and interesting narrative outcomes. The interface for the game would require a coordinated physical gesture to “turn the page” of the story and enact the magic words, creating a fun, repetitive moment of play that would connect parents and children to each other and form an memorable, positive connection to reading and learning together.

next steps

Though the purpose of the convening was exploratory, and not intended to gain consensus on R&D or funding priorities, participants suggested several next steps to consider. The following possible action initiatives were discussed.

Research organizations

- Research scientists who participated in the workshop suggested the formation of multi-disciplinary teams to design more definitive studies to determine the conditions, population groups, and settings in which intergenerational play may benefit young children's literacy learning. The group recommended a follow-up convening with other scholars to discuss study designs, available research funding and possible long-term collaboration.
- It was recommended that federal research initiatives operated by the National Science Foundation, the National Institutes for Health, and the US Department of Education give priority to research on the potential of digital games in learning and health promotion. The Corporation for Public Broadcasting was urged to continue R&D activities in this arena.

Media organizations

- Media organizations and producers of public media requested tangible incentives to collaborate with game developers on the creation of a series of literacy-oriented games, in line with the goals established by future Ready-to-Learn program priorities, as well as other national priorities in education, health and civic participation. The Corporation for Public Broadcasting was urged to develop a new digital games investment capacity, to prioritize partnerships for educational media producers with leaders from the commercial game sector, and to examine new business models for widespread distribution.

- The Joan Ganz Cooney Center at Sesame Workshop stated its plans to announce an Innovation in Children's Digital Media prizes program in 2009. The program focuses on incenting industry and university media labs to produce research-based games and other digital innovations for young children. The prizes will challenge these social entrepreneurs to use digital media to promote breakthroughs in learning.


Game development companies

- E-line Ventures, a double-bottom line venture company devoted to supporting educational and empowering video games, discussed the possibility of developing a series of games that will focus on intergenerational play and publish them if funding can be identified.
- Some workshop participants signaled substantial interest in forming public-private collaborations with government support.



Public and philanthropic sectors

- Representatives of the Corporation for Public Broadcasting and philanthropic organizations committed to making educational games development a high priority in future funding decisions, and to consider the potential pay-off of intergenerational play.

conclusion



While public support recognizing the potential for video game play and literacy learning is not yet fully developed, workshop participants agreed that the ubiquity of digital media in children's and adults' lives is an important untapped opportunity for intergenerational contact. Although legitimate concerns about the prevalence of unhealthy or inappropriate products in the gaming marketplace still exist, the debate in the coming years should no longer be on whether we use games and digital media to support literacy learning, but about exploring how to use popular media to the greatest advantage. Just as *Sesame Street* introduced children and their families to the potential of television two generations ago, workshop participants concluded that today's generation will learn more together if games become a major force for learning and discovery in the next decade.



appendix a: meeting participants



Participants

Joaquin Alvarado

Senior Vice President for Diversity & Innovation,
Corporation for Public Broadcasting

Richard Beckwith

Research Psychologist, Intel

Lewis Bernstein

Executive Vice President of Education,
Research & Outreach, Sesame Workshop

Fran Blumberg

Associate Professor, Fordham University

Brendan Boyle

Partner, IDEO ToyLab

Howard Byck

Senior Vice President of Lifestyle Products,
AARP Services, Inc.

Cynthia Chiong

Postdoctoral Research Fellow,
The Joan Ganz Cooney Center at Sesame Workshop

Juan Devis

Director of New Media Production, KCET

Ken Eklund

Writer Guy

Barrett Fox

Co-Founder & Creative Director, COCO Studios

Tracy Fullerton

Associate Professor in the Interactive Media
Division of the School of Cinematic Arts,
University of Southern California;
Director, Electronic Arts Game Innovation Lab

Alan Gershenfeld

Co-Founder & Managing Partner, E-Line Ventures

Heather Horst

Associate Project Scientist, University of California,
Irvine (Digital Media & Learning Hub, UC Humanities
Research Institute)

Gary Knell

President & CEO, Sesame Workshop

Michael Levine

Executive Director,
The Joan Ganz Cooney Center at Sesame Workshop

Silvia Lovato

Director, PBS Kids Go! Interactive

Miles Ludwig

Vice President & Executive Producer of Digital Media,
Sesame Workshop

Laird M. Malamed

Senior Vice President of Production,
Activision, Inc.

Ellen Hamilton Newman

Postdoctoral Fellow, Ready to Learn,
University of Michigan

Shelley Pasnik

Director, Center for Children & Technology,
Education Development Center

Nichole Pinkard

Senior Research Associate, Chief Technology
Officer, and Director, Information Infrastructure
System Project, Center for Urban School
Improvement, University of Chicago

Michael Renov

Associate Dean of the School of Cinematic Arts,
University of Southern California



Participants

Madeline Schroder

General Manager, Mighty Play

Michael Shore

*Vice President of Worldwide Consumer Insights,
Mattel Inc.*

Bill Shribman

*Executive Producer of Kids' Projects,
WGBH Interactive*

Frederic Soulie

*Vice President of Digital Media,
Cookie Jar Entertainment*

Benjamin Stokes

*PhD Student at the Annenberg School for
Communication, University of Southern California;
Program Officer, MacArthur Foundation*

Ann My Thai

*Assistant Director,
The Joan Ganz Cooney Center at Sesame Workshop*

Celia Hodent Villaman

Strategic Innovation Lab Manager, Ubisoft

Dan White

*Founding Partner & Lead Producer,
Filament Games*

Susan Zelman

*Senior Vice President &
Chief Advisor for Education Policy,
Corporation for Public Broadcasting*

appendix b: intergenerational play & literacy design workshop agenda

! Time	
9:00am	Breakfast Available
9:30am	Welcome and Introductions <ul style="list-style-type: none"> • Michael Renov, Associate Dean, USC School of Cinematic Arts • Gary E. Knell, CEO Sesame Workshop • Susan Zelman, Senior Vice President, Corporation for Public Broadcasting
9:50am	Meeting Purpose & Goals, Recap from 2008 Workshop, Literacy Revisited <ul style="list-style-type: none"> • Michael Levine, Executive Director, Joan Ganz Cooney Center • Tracy Fullerton, Associate Professor, USC School of Cinematic Arts, Interactive Media Division and Director, EA Game Innovation Lab • Ellen Hamilton Newman, Postdoctoral Fellow, University of Michigan
10:20am	Research Findings from USC and JGCC on Intergenerational Game Play
11:10am	Family Use of Video Games and Digital Media Discussion led by: <ul style="list-style-type: none"> • Heather Horst, Associate Project Scientist at the University of California, Irvine Humanities Research Institute (UCHRI) • Nichole Pinkard, Senior Research Associate, Chief Technology Officer and Director of the Information Infrastructure System Project, Center for Urban School Improvement, University of Chicago • Fran Blumberg, Associate Professor, Fordham University
11:40am	Small Group Discussion: The "Perfect" Intergenerational Video Game Groups of 3-5 people brainstorming principles for concept, prototyping and development of a line of intergenerational games
12:30pm	Lunch Break

! Time	
1:15pm	Differential Access to Technology and Children's Motivation to Learn Discussion led by Richard Beckwith, Research Psychologist, Intel
1:45pm	Building a Market for Intergenerational Play: Lessons Learned, Opportunities to Seize? Discussion led by: <ul style="list-style-type: none"> • Brendan Boyle, Partner, IDEO ToyLab • Alan Gershenfeld, Co-Founder and Managing Partner, E-Line Ventures
2:15pm	Small Group Discussion: Back to Reality – The Perfect, Yet Practical, Intergenerational Video Game <ul style="list-style-type: none"> • Returning to the earlier discussions, groups will now fine tune their ideas
3:30pm	Review of Ideas from Small Group Discussions
4:00pm	Conclusion: Recap & Next Steps <ul style="list-style-type: none"> • Michael Levine and Tracy Fullerton

appendix c: intergenerational digital learning concept paper: can video games help close the literacy gap in the other america?

Armanda Lewis, the Joan Ganz Cooney Center

Overview: How can digital media address fundamental learning gaps?

For decades, the expert consensus has been that the most important problem in American education is the substantial achievement gap between economically disadvantaged students and their middle class counterparts. Although the National Assessment of Educational Progress (NAEP, 2007) in the U.S. has shown improvements in fourth-grade reading in recent years (particularly in 2002), there is still a long way to go. Effective early literacy programs are needed for all children, of course, but making available new tools to close fateful learning gaps is of particular importance for children from high risk environments.

Among the key reasons for the achievement gap is a substantial difference in the language skills, vocabulary and background knowledge of advantaged and disadvantaged students. Middle class children enter school with greater experiences in language, and background knowledge that lay the groundwork for a trajectory of success. Over time, differences in achievement grow, due largely in part to the guidance and mentoring that higher income children typically receive from parents and other adults. Advantaged children have many more opportunities, on average, to practice and use new words, content knowledge and ideas they gain in school, in their homes, and communities. In contrast, many low-income children, due to differences in access to resources, are forced to depend more heavily on their teachers and community resources for help building literacy skills.

Today, another critical learning gap among children in the U.S. is emerging. Low-income and minority children are not only falling behind and failing to catch up on basic literacy and computational skills, they are also facing new risks as a more complex, interconnected global economy requiring a new set of literacies takes hold. If children do not learn how to manipulate and control communications technologies, creatively problem-solve, and work in peer and inter-generational teams, they will be at a serious disadvantage.

Our team of educational media, video game design, education reform, and literacy researchers see a compelling opportunity to address these critical learning gaps, while pioneering the breakthrough potential of digital media to make a profound difference in the lives of the children who continue to live in what Michael Harrington referred to as the “other America” over 45 years ago. Young children’s immersion in media provides a compelling, and largely untapped strategy to seek new opportunities to close important learning gaps. A key challenge is to

identify levers where learning approaches and existing digital media habits may converge. During the developmental period beginning at school entry and leading up to the fourth grade, children are increasingly exposed to digital media and consumer electronics (NPD Group, 2007).¹ In an age where the use of the Internet, cell phones, and video games is ubiquitous, can a new opportunity be forged to design educational media that will positively affect learning outcomes while building intergenerational ties?

A tested approach and a new partnership

The Joan Ganz Cooney Center (JGCC) at Sesame Workshop, the Electronic Arts Game Innovation Lab at the University of Southern California (GIL), and the University of Michigan’s School of Education and the Learning Sciences have formed a research and development partnership, with support from the Corporation for Public Broadcasting’s Ready to Learn Initiative, to explore the potential of video games in addressing the critical early literacy gap among low income children in the U.S. The team is developing a new line of work intended to systematically examine the ability of video games to develop foundational knowledge-building skills in elementary age children with the support of adults and other mentors.

In our first phase of work, over the next two years, we will form a multi-sector design, research, and community assessment team to examine how to build an accessible and highly engaging video game that will yield substantial educational and social benefits. This model follows the highly successful approach to developing educational media that Sesame Workshop has followed for nearly four decades, in the U.S. and around the world. The key question we will explore is: Can a video game create a learning environment that encourages intergenerational play and sustained guidance while promoting critical background knowledge and expertise for future, more advanced learning? That is, recognizing the significant differences in achievement

¹The NPD Group reports that the average age when kids first use consumer electronics has dropped to 6.7 years in 2007 from 8.1 in 2005 (NPD Group, 2007).

between economically disadvantaged children and their middle-income peers, might an engaging, intergenerational game improve:

- A student's early literacy skills and content knowledge
- Adult-child/Mentor-child literacy skills
- Positive interaction and collaboration that promotes social development

Key issues

The first years of elementary school (ages 6 to 9) are a pivotal time, both in terms of the child's status as learner and as future video gamer. Upon entering school, children who have an easier time reading and learning new information are those already equipped with a large bank of background/prior knowledge.² Background knowledge and the schema to organize it are developed continuously through purposeful and casual interactions with people and objects in the child's world (Crowley & Jacobs, forthcoming). Around the fourth grade, children begin to hit a wall if they lack the content knowledge that allows them to read for understanding and information, rather than merely sounding out text; literacy expert Jeanne Chall has called this the "fourth-grade slump" (Shore, 2008). As text becomes more difficult and stretches beyond young readers' daily experiences, children must know not only more words but also more about the world in order to understand and learn from what they are reading (Chall & Jacobs, 2003). This shift from "learning to read" to "reading to learn" ideally happens during the primary years. Since strong prior knowledge is directly related to a child's ability to know and understand how things work, to learn to read and write, and to strategize effectively, the building of this knowledge is essential.

A key component of the intergenerational video game study, therefore, will be to analyze the capacity of video games to reinforce and advance a child's background knowledge. Successfully obtaining background knowledge is essential to the learning process in which a young child

transitions from being a beginning learner to an expert learner. This process involves not only gaining factual expertise in specific domains, but more importantly, learning how to develop schema and when to implement certain schema in solving problems. Research on how individuals gain expertise reveals that the difference between experts and novices is not just their general abilities, but experts' acquisition of background knowledge which influences "what they notice, and how they organize, represent, and interpret information in their environment" (Bransford et al, 2000). Susan B. Neuman specifically connects prior knowledge to literacy—"important learning processes require content knowledge"—and contends that the earlier a child is able to develop schema such as decoding processes, the more time can be spent in understanding the text, which in turn will provide more opportunities to practice reading (Neuman, 2001).

Studies indicate that video games can boost cognitive processing since play requires understanding rules, recognizing patterns, dealing with large amounts of complex information, and inventing and testing tactics to accomplish goals (Gee, 2003). According to Bogost, video games cultivate *procedural literacy*, an ability to reorganize existing knowledge in order to consider problems from various perspectives and as a result gain a better understanding of how our world is structured (Bogost, 2005). James Paul Gee notes that younger learners are now using digital media, including video games, to gain domain-specific knowledge. This modern phenomenon of the "Pro-Ams" consists of "amateurs who have become experts at whatever they have developed a passion for... In fact, it seems that in any field developing such a passion is a sine qua non of deep learning that leads to expertise" (Gee, 2008). Gee also observes that digital games allow children to engage with traditional book content interactively by illuminating the connections between words/signs and the real world. "They can see how these connections can be used for problem-solving...

²Researchers have tied weak academic skills, including literacy, to a lack of background knowledge and range of experiences. See Hart and Risley (1995).

Young people can build up an arsenal of ‘situated meanings’ for words that will allow deeper and better learning (of rich content) from texts.”¹⁶

In addition to the 6-to-9 age range being a crucial point for knowledge development, it is also relevant in a child’s status as a “digital expert,” where the amount of time spent playing games increases dramatically and there is a shift from using kid systems to more complex portable and console-based games.³ Video games possess qualities that may uniquely position them as a tool in teaching children how to categorize and develop schema around information and build analytical ability (Jenkins et al, 2006). A core characteristic of games, according to Kurt Squire, “is that they are organized around *doing*. They are uniquely organized for a *functional* epistemology, where one learns by doing, through performance” (Squire, in press). Through cycles of action and interpretation, game play mechanics create the potential for transformative learning in the development of core literacy skills. Existing game structures make use of important background knowledge and schema-building skills, making connections between real world information and interactive play an interesting “test bed” for promoting the knowledge and “habits of mind” of underserved children.

A main premise of the new action research is that video games are an ideal medium for cultivating problem-solving expertise and for advancing background knowledge and literacy in young learners. A child possessing prior knowledge in a topic mimics on a small scale the cognitive abilities of an advanced expert: both “reflect repeated exposure to domain-specific declarative knowledge, repeated practice in interpreting new content, making inferences to connect new knowledge to existing knowledge, repeated conversations with others who share or want to support the same interest, and so on” (Crowley & Jacobs, forthcoming). One critical question is how video games actually encourage such practice and build expertise. Another is how

natural patterns of learning within and among particular socio- and ethno-cultural communities can be leveraged to include engaging and motivational digital media such as games.

The affordances of video games could enhance proven interactive literacy learning and knowledge-building. Adult participation and support, or “scaffolding,” is indispensable for supporting a child’s early literacy experiences, and research has documented that parental involvement, principally in the form of interactive reading between parent and child, is an effective method of advancing a younger child’s literacy skills (Storch & Whitehurst, 2001). In particular, intergenerational literacy experiences, beginning in daily reading, oral language practice, and dialogue between adult, older mentor, and child proves to be an important factor in the way in which children become familiar with story structures and literary conventions, understand the register of written language, and gain a lasting interest in learning (Klesius & Griffith, 1996). Children from middle- and upper- income households are more likely to receive this support from family members while children in low income households are more likely to depend on outside institutions such as schools and libraries for this support. And increasingly, low-income families include multiple caregivers who must combine forces to support children’s learning, including grandparents who are delivering full-time care in low income and minority communities. AARP estimates that over 4 million young children are in the care of elders in the US.

The features of interactive games provide great potential for an environment where children can powerfully engage in learning, and possibly narrow the scaffolding gap that exists between lower income children and their counterparts (Neuman & Celano, 2006) by supporting intergenerational learning and mentoring between older and younger siblings. In this respect, our definition of intergenerational learning is designed to

³http://www.consumeraffairs.com/news04/2007/10/video_games_time.html

capture the important relationships that are often created between older and younger students in boys and girls clubs, and afterschool programs.

The project will address the pressing need for research on new and effective approaches to learning that carefully consider how and where children spend their time, as well as the growing influence of digital media, especially among traditionally underserved populations. While video games have tended to encourage “child-only” or “adult-only” play patterns, the prospect of a video game requiring collaboration between child, youth mentors, and adult caregivers foretells a future where digital tools bridge generational gaps and foster opportunities for cooperative learning. There is little research to speak of regarding adult-child interactions via gaming, and even less research which focuses on middle childhood or game play that promotes learning. Mimi Ito’s ethnographic research (Ito et al, 2009) on older children and Yasmin Kafai’s research on the game play of children engaged in the virtual *Whyville* (Kafai, in press) suggests that new lines of inquiry on how youth mentors might offer vital support to younger players in a game community may bear fruit. Other market-based research by companies such as Electronic Arts suggest that new gaming platforms such as the Wii have stimulated an intergenerational momentum to game play as a new family experience, akin to earlier generation’s use of classics such as *Scrabble*, *Monopoly*, and *Candy Land*. Could it be possible that video game play is a modern day antidote to Robert Putnam’s famous allusion to America’s “bowling alone” challenge?

In sum, the project will provide opportunities for the core team, and others who will join an external advisory group, to closely study intergenerational interactions and to design a pattern of use that enhances play and learning experiences for children. The project holds the potential to pioneer a new theory of learning,

to design a scalable model of enduring benefit, and to inspire other digital media developers to innovate in ways to encourage children’s learning and healthy development.

appendix d: literature review

Cynthia Chiong, the Joan Ganz Cooney Center

Overview

Video games have grown to be a ubiquitous staple in most households. In fact, game play among young children under ten is growing at a rapid pace. Unfortunately, there has been a dearth of research exploring how video games might accelerate children's learning and healthy development. Much of the research on video games has focused on their impact on children's behavior, health, and spatial skills, and less on their potential to propel literacy development. In brief, the research does provide decent evidence that video games can influence social, physical, and cognitive outcomes, and may be an effective way to engage heavy media users who are struggling academically.

More research is needed in how to use video games for learning and engagement, particularly for low-income children who stand to benefit from the increased guidance and support that may result. One area that appears a ripe area for research and design work is intergenerational game play. Common sense and research tell us that parents and caring adults undoubtedly play an important role in teaching children. Research has shown positive effects of parental involvement in areas such as homework (e.g., Bailey, 2006), and book reading (e.g., Ortiz, Stowe, & Arnold,

2006; Justice, Weber, Ezell & Bakeman, 2002). This brief literature review examines children's video game play patterns, how parents and children interact in informal learning settings, and finally, parent's attitudes towards video games. Since there has not yet been a robust research effort on intergenerational game play itself, these related areas may provide good insights for new research and development

Kids and video games: What we know

Thus far, what we know about children and video games is that video game play is an activity that children tend to do by themselves. According to an Annenberg survey (2000), 55 percent of 7th- through 12th-graders play video games as a single player, 36 percent play with siblings or peers, and only 2 percent play with their parents. This is supported by a study of younger children in which six kindergarteners in family day care were observed during play (Bacigulupa, 2005). The majority of the kindergarteners chose to play videogames over interacting with each other and also over other toys and activities. When playing the video games, the children focused mainly on the screen, ignoring the other children and activities. Interestingly, the children *not* playing the video games chose to watch the child playing video games rather than embark on a different activity. These children watched in silence while waiting their turn on the single-player video games, also focused on the screen. On several occasions, a few of the children were engaged and interacting with one another during a different activity, but when another child started playing a video game, the other children became distracted from their activity. The video game play area in this study was highly interesting for the children, but discouraged social interaction.

We also know that children, beginning at an early age, are adept at learning how to play video games. The surveys cited in the Joan Ganz Cooney Center's *Game Changer* report (Thai, Lowenstein, Ching, & Rejeski, 2009) show that children start playing video games at an early age and that they play often. Blumberg and Sokol

(2001) investigated how 2nd through 5th-graders learn to play a new video game. The results were that the younger children were more "external," asking others for help. Older children and frequent players were more "internal," reading directions on their own and mainly learning through trial and error. Children of different ages apparently have different strategies for learning how to play a video game. By 4th or 5th grade, children can seemingly learn to play video games quickly and on their own.

Although children may be able to learn how to play a video game quickly, it is unclear what they learn best from the variety of video games. Research suggests that young children may have difficulty generalizing what they learn from video games to the real world. There is a well established line of research showing that infants and toddlers have a "video deficit" meaning that they learn less well from video displays than live displays (Anderson & Pempek, 2005) and that they have trouble understanding that a video image is a symbolic *representation* that displays information about something other than itself—its *referent*, thus not achieving "dual representation" (DeLoache, 1999). There is some evidence that older children may experience similar difficulties with video games. Okita (2004) found that 5- and 6-year-olds over generalized information across different media. The children were taught facts about a dog with a stuffed animal, a book, or a video game. The depicted dog looked similar across all three media, but not identical. The children over generalized the facts that they learned from one medium to another. For example, after learning that the stuffed animal dog's name was Sam, they would automatically assume that the dog depicted on the video game was the same Sam. Thus, although young children may be capable and satisfied to play video games by themselves, it is unclear to what extent they understand the content of the video games on their own. A key question for R&D is to discover at which ages

and under what conditions the greater understanding of higher level and basic skills normally takes hold, with digital media like games.

Family interactions and informal learning

Parent-child interactions in an informal learning setting may offer implications for parent-child video game interactions. The research thus far has focused heavily on book reading interactions and some museum, free play, and game interactions.

Books

In general, during a parent-child book reading interaction, the parent is more in control of the nature of the interaction than the child is. Parents make many decisions during a book reading interaction. One way in which parents control the interaction is by the *level* at which they interact with their children. Parents generally scaffold by adjusting the types of prompts and feedback they give according to the age of their child (Senechal, Cornell, & Broda, 1995; Danis, Bernard, Leproux, 2000, Murphy, 1978; DeLoache & DeMendoza, 1987; Van Kleeck, Alexander, Vigil, & Templeton, 1996). At the same time, they also show flexibility by contributing less with familiar books than with novel books, allowing the child to decide the pace and focus of the reading (Haden, Reese, & Fivush, 1996; Van Kleeck, 1997). Another example of how parents control the interaction is that they decide *what* features in a book to talk about and how to talk about them (Gelman, Coley, Rosengren, Hartman, & Pappas, 1998).

Furthermore, the style of how parents read with their child can affect the child's learning. Several studies have found that young children's language and print skills improved when parents were trained to read in a style that encouraged their child to actively participate during book reading interactions (Whitehurst et al., 1988; Arnold, Lonigan, Whitehurst, & Epstein, 1994; Reese & Cox, 1999). This may have particular implications for low SES families because of the potential for literacy difficulties for these children. Bus, van Ijzendor, and Pelligrini, (1995)

found no differences in the frequency of book reading experiences between low and high SES families, though there have been reported differences in the quality of the interaction between groups of different SES (Hammer, 2001; Torr, 2004). Whitehurst et al (1994), Neuman and Gallagher (2001), and Neuman, Hagedorn, Celano, and Daly (1995) were able to teach low SES parents how to effectively read with their child. Thus, the literature on parent-child book-reading interactions provides evidence that when parents take an active role, they can effectively interact with their child in an educationally beneficial manner and, in turn, help improve their child's literacy skills.

Museums

Museums are good venues for families to have interesting and educational experiences. In a review of museum literature, Dierking and Falk (1994) found that families tend to visit museums with the idea of learning and teaching in mind. They also found that mothers tend to follow others to a specific exhibit rather than lead their family to one. In recent years, more research has focused on group differences in family interactions at museums. Szechter and Carey (2008) found that parents with lower education levels spent less time at each exhibit and related prior experiences less than parents with higher education levels. Crowley, Callanan, Tenenbaum, and Allen (2001) found that parents explained science exhibits more to their boys than to their girls.

Free play

Observations during free play can help predict family dynamics. The literature observes that fathers like to engage in more "rough and tumble" play, encouraging more active and riskier activities with their children, whereas mothers are more nurturing (Paquette, 2004). Frascarolo, Favez, and Fivaz-Depeursinge (2001) support this idea with their finding that when both father and mother play with their infant in a sitting position, the mother was more comfortable with the active role while the father was more comfortable with the

passive, third party role. The researchers hypothesize that the fathers may be more active with a physical game. Thus, family dynamics during play may be affected by the gender of the parent, child, and the type of activity.

Together, these findings suggest that there are natural group differences, specifically with gender and SES. Gender may be a key issue for video games as well. Survey data (Annenberg, 2000) indicates that, overall, boys play more often than girls. Boys prefer violent video games that are more realistic whereas girls prefer more cartoon/fantasy games. These differences can affect how parents interact with boys and with girls during video game play. In regards to SES differences, video games may be a good opportunity to bridge this gap. In a recent survey, Futurelab (2009) found that while high SES families owned more technology such as computers and Internet access than low SES, there was little difference in video game console ownership. This suggests that there may be a high level of familiarity and interest in video games among low SES families. Low SES families may be more willing to spend time playing video games together than other activities.

Games

Researchers have begun to examine game play with families. Kliman (2006) explored how to increase parental involvement in math and geography activities with their child in a game format. They gave families with children ages 7 to 13 geography and math games to play and followed them for four months. They found that families with children 10 years old and younger were more likely to continue playing these games. The older children were busier with school and other activities and so game play dropped off. Other reasons that families cited for not playing the games were that the children would rather play with a familiar game or that playing games was not a part of their routine. This study provides evidence that it may be difficult to embed educational topics into inter-generational games in an appealing and effective

manner, especially for older children. Furthermore, although the parents recognized that these games promoted learning, only one parent recognized the potential benefit for their child's school performance.

Another study more closely examined how families play games together. Bjorkland, Hubertz, and Reubens (2004) had parents and their 5-year-olds play *Chutes and Ladders* with added related math questions at the end of each turn. They found that the parents treated instruction during the game and during the math questions differently. They were more hands-off during the game itself than during the math questions. They often did not offer strategy or instructional information during the child's turn, but rather waited to show their child a good strategy on their own turn. The children did not always follow their parents' suggestions, nor did the parents insist that the children alter their strategies accordingly. On the other hand, with the math questions, the parents often directly discussed and reinforced strategy use. These results suggest that parents may not normally view social contexts as learning opportunities.

Parents' attitudes toward video games

Informal learning research suggests that parental attitudes toward a specific medium may affect the extent to which they use that medium for educational purposes. Parents seem to take more control over the interaction when they view it as an educational activity like book reading than when they view it as a less traditional educational activity such as board game play. Futurelab (2009) conducted a project investigating learning in families. They found that 90 percent of the parents mentioned using some sort of technology to teach/learn in the family. However, only 7 percent mentioned using a game console as opposed to 66 percent who mentioned using the Internet and 34 percent who mentioned using television/DVDs/videos. Furthermore, when asked what type of technology they would like to use *more*, only 4 percent chose a game console.

These findings are similar to the 2008 survey conducted by the Joan Ganz Cooney Center and Common Sense Media.

Nikken and Jansz (2006) conducted a survey specifically looking at parents and video games. They determined three categories of parent interaction: (a) Restrictive Mediation, which includes behaviors such as monitoring gaming behavior, specifying games that are appropriate and reading content description; (b) Active Mediation, which includes behaviors such as pointing to bad/good things in a game, explaining what happens in a game, and evaluating game content; and (c) Co-playing, in which parent and child play together, either because the child asked or the parent wanted to. Co-playing was the least frequent interaction type and occurred mainly when the parents thought the game promoted social behavior. Interestingly, the parents reported co-playing more often than the children. (Note: As stated earlier, only 2 percent of the children in the Annenberg report said that they played with their parents.)

Together these studies show that parents do not often think of using video games to teach their child, and that they seldom play video games with their child in any context.

Implications for intergenerational video games

The literature reviewed here raises the following questions for intergenerational video game play in an educational context:

- How can video games encourage both content mastery and social interaction?
- How can we ensure that children generalize what they learn from video games and apply it to the real world?
- How can we design video games that address group differences?
- How can we design video games that are interesting to both parents, other caregivers, and children?

- How can we lead parents to view video games as an educational opportunity for their children?

Designing and creating intergenerational video games may help to answer some of these questions. Parents and caregivers can take the lead in encouraging social interaction during the game, ensuring that both parties spend time communicating with each other rather than remaining focused on the screen. Parents and caregivers can also reinforce the information across media. For example, after playing a vocabulary video game, they can point out the same words in real-world settings.

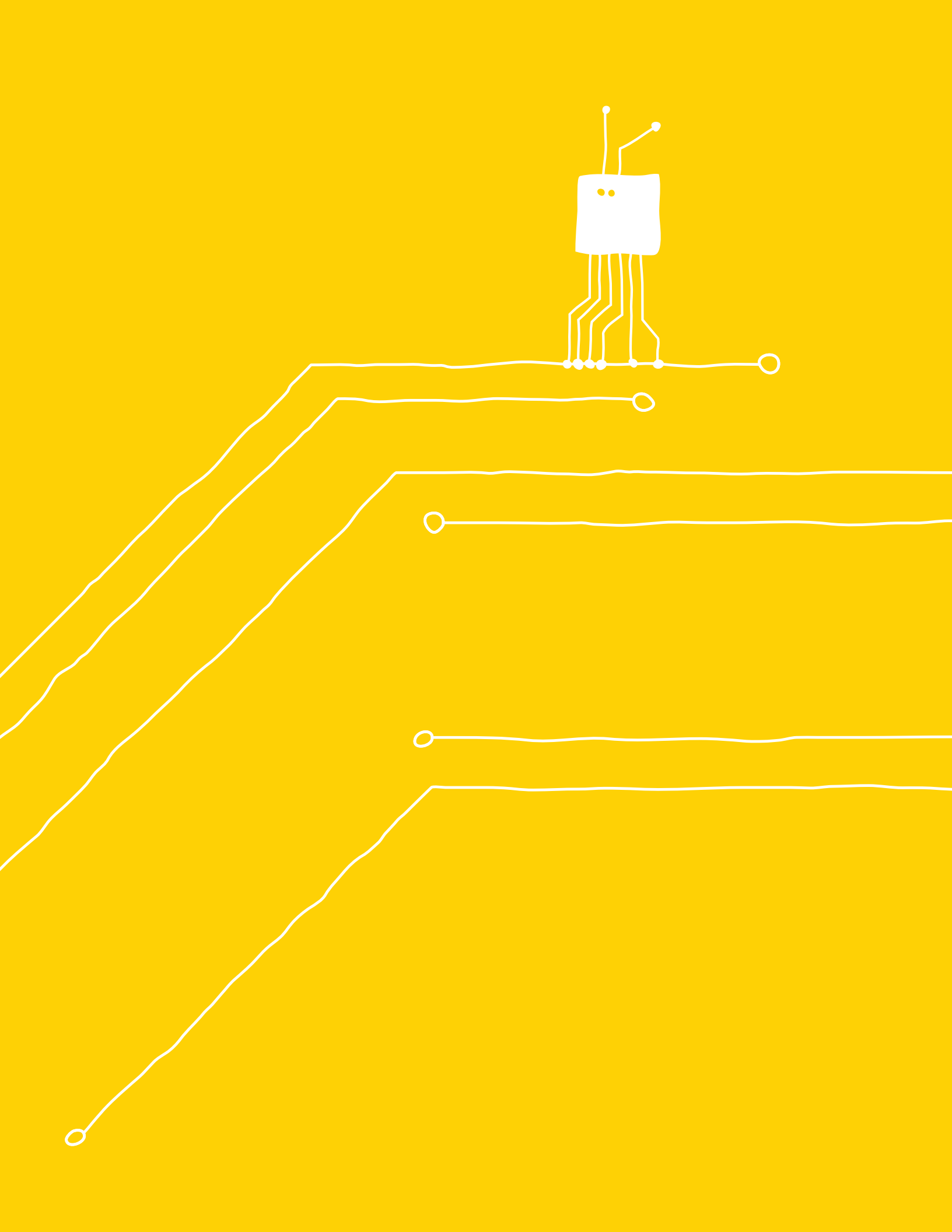
A key challenge may include the need to alter parental views about video games. The book reading interaction literature provides evidence that parents of both high and low SES can effectively interact with their children in informal environments. This can certainly be true with video games. Thus, it is not a question of *can* parents interact well with their child while playing video games but rather *will* they? The prevalence of video games in homes and the related research suggests that with further exploration, video games can become a promising medium for intergenerational interaction.

references

- Anderson, D. R., & Pempek, T. A. (2005). Television and very young children. *American Behavioral Scientist*, 48, 505-522.
- Annenberg Public Policy Center (2000). Media in the home: The fifth annual survey of parents and children. Retrieved September 10, 2009 http://www.education.com/reference/article/Ref_Children_Video_Games/
- Arnold, D. H., Lonigan, C. J., Whitehurst, G. J., & Epstein, J. N. (1994). Accelerating language development through picture book reading: Replication and extension to a videotape training format. *Journal of Educational Psychology*, 86, 225-243.
- Bacigalupa, C. (2005). The use of video games by kindergarteners in a family child care setting. *Early Childhood Education*, 33(1), 25-30.
- Bailey, L. B. (2006). Interactive homework: A tool for fostering parent-child interactions and improving learning outcomes for at-risk young children. *Early Childhood Education Journal*, 34(2), 155-167.
- Bjorkland, D. F., Hubertz, M. J. & Reubens, A. C. (2004). Young children's arithmetic strategies in social context: How parents contribute to children's strategy development while playing games. *International Journal of Behavioral Development* 28(4), 347-357.
- Blumberg, F. C., & Sokol, L. M., (2004). Boys' and girls' use of cognitive strategy when learning to play video games. *The Journal of General Psychology*, 131(2), 151-158.
- Bogost, I. (2005). Procedural literacy: problem solving with programming, systems and play. *Telemidium: The Journal of Media Literacy*, 52(1 & 2), 32-36.
- Bransford, J. D. et al., Editors. (2000). *How people learn: Brain, mind, experience, and school*. Expanded Edition. Washington, D.C.: National Research Council, 31.
- Bus, A. G., van Ijzendoorn, M. H., & Pellegrini, A. D. (1995). Joint book reading makes for success in learning to analysis on intergenerational transmission of literacy. *Review of Educational Research*, 65(1), 1-21.
- Chall, J. S., Jacobs, V.A., & Baldwin, L.E. (1990). *The Reading Crisis: Why poor children fall behind*. Cambridge, MA: Harvard University.
- Chall, J.S., & Jacobs, V.A. (2003). Poor children's fourth-grade slump. *American Educator*. 27(1), 14-15
- Crain-Thoreson, C., Dahlin, M. P., & Powell, T. A. (2001). Parent-child interaction in three conversational contexts: Variations in style and strategy. *New Directions for Child and Adolescent Development*, (92), 23-37.
- Crowley, K. & Jacobs, M. (forthcoming). Building islands of expertise in everyday family activity. *Learning Conversations in Museums*. Mahwah, NJ: Lawrence Erlbaum Associates, 5.
- Crowley, K., Callanan, M. A., Tenenbaum, H. R., & Allen, E. (2001). Parents explain more often to boys than to girls during shared scientific thinking. *Psychological Science*, 12(3), 258-261.
- Danis, A., Bernard, J. M., & Leproux, C. (2000). Shared picture-book reading: A sequential analysis of adult-child verbal interactions. *British Journal of Developmental Psychology*, 18, 369-388.
- DeBruin-Parecki, A. (2007). *Let's read together: improving literacy outcomes with the adult-child interactive reading inventory*. Baltimore: Paul H. Brookes Publishing Co.
- DeLoache, J. S. (1987). Rapid change in the symbolic functioning of very young children. *Science*, 238, 1556-1557.
- DeLoache, J., & DeMendoza, O. A. P. (1987). Joint picture-book interactions of mothers and 1-year-old children. *British Journal of Developmental Psychology*, 5, 111-123.
- Dierking, L. D., & Falk, J. H. (1994). Family behavior and learning in informal science settings: A review of the research. *Science Education*, 78(1), 57-72.
- Fisch, S. M. (2004). *Children's learning from educational television: Sesame Street and beyond*. Lawrence Erlbaum Associates, Mahwah, New Jersey.
- Frascarolo, F., Favez, N., & Fivaz-Depeursinge, E. (2003). Fathers' and mothers' performances in father-mother-baby games. *European Journal of Psychology of Education*, 18(2), 101-111.

- Gee, J. P. (2003). *What video games have to teach us about learning and literacy*. New York: Palgrave-McMillan; Greenfield, P. M. (1984). *Mind and media: The effects of television, video games and computers*. Cambridge, MA: Harvard University Press.
- Gee, J. P. (2008). Getting over the slump: Innovation strategies to promote children's learning. New York: The Joan Ganz Cooney Center at Sesame Workshop, 15.
- Gelman, S., Coley, J. D., Rosengren, K. S., Hartman, E., & Pappas, A. (1998). Beyond labeling: The role of maternal input in the acquisition of richly structured categories. *Monographs of the Society for Research in Child Development*, Serial No. 253, 63(1).
- Grant, L. (2009). Learning in families: A review of research evidence and the current landscape of learning in families with digital technologies. Bristol, UK: Futurelab. Retrieved June, 2009 from <http://www.futurelab.org.uk>
- Hammer, C. S. (2001). Come and sit down and let Mama read: Book reading interactions between African American mothers and their infants. In J. L. K. Harris, G. Alan, K. E. Pollock (Eds.). *Literacy in African American communities*. Mahwah, NJ, Lawrence Erlbaum Associates, Publishers: 21-43.
- Hart, B. & Risley, T. (1995). *Meaningful differences in the everyday experience of young American children*. Brookes Publishing Company, Baltimore, MD.
- Ito, M., Baumer, S., Bittanti, M., boyd, D., Cody, R., Herr, B., Horst, H. A., Lange, P. G., Mahendran, D., Martinez, K., Pascoe, C., Perkel, D., Robinson, L., Sims, C., and Tripp, L. (2009). *Hanging out, messing around, and geeking out: Living and learning with new media*. Cambridge, MA: MIT Press. Retrieved July 10, 2009 from <http://digitalyouth.ischool.berkeley.edu/report>
- Jenkins, H., Clinton, K., Purushotma, R., Robison, A. J., & Weigel, M. (2006). *Confronting the challenges of participatory culture: Media education for the 21st century*. Chicago: The MacArthur Foundation.
- Joan Ganz Cooney Center & Common Sense Media (2008). *Growing up digital: Adults rate the educational potential of new media and 21st-century skills*. New York: The Joan Ganz Cooney Center at Sesame Workshop.
- Justice, L. M., Weber, S. E., Ezell, H. K., & Bakeman, R. (2002). A sequential analysis of children's responsiveness to parental print references during shared book-reading interactions. *American Journal of Speech-Language Pathology*, 11, 30-40.
- Kafai, Y. B. (Ed.) (in press). The World of Whyville: Living, playing, and learning in a virtual world. *Games and Culture*.
- Klesius, J. P. & Griffith, P. L. (1996). Interactive storybook reading for at-risk learners. *The Reading Teacher*, 49(7), 552-560.
- Kliman, M. (2006). Math out of school: Families' math game playing at home. *School Community Journal*, 16(2), 69-90.
- Lareau, A. (2003). *Unequal childhoods: Class, race, and family life*. University of California Press.
- Michael Cohen Group (2008). *Children, families, and media: A benchmark*. Michael Cohen Group, LLC. New York.
- Murphy, C. M. (1978). Pointing in the context of a shared activity. *Child Development*, 49, 371-380.
- Neuman, S. B. (2001). The role of knowledge in early literacy. *Reading Research Quarterly*, 36.4(Oct-Dec 2001), 468-475.
- Neuman, S. B., & Celano, D. (2006). The knowledge gap: Implications of leveling the playing field for low-income and middle-income children. *Reading Research Quarterly*, 41(2), 176-201.
- Neuman, S. B., & Gallagher, P. (2001). Joining together in literacy learning: Teenage mothers and children. *Reading Research Quarterly*, 29(4), 383-401.
- Neuman, S. B., Caperelli, B. J., & Kee, C. (1998). Literacy learning, a family matter. *The Reading Teacher*, 52(3), 244-252.
- Neuman, S. B., Hagedorn, T., Celano, D., & Daly, P. (1995). Toward a collaborative approach to parent involvement in early education:

- A study of teenage mothers in an African-American community. *American Educational Research Journal*, 32(4), 801-827.
- Nielson Company (2009, August). Hottest June on record for video gaming. Retrieved September 10, 2009 from http://blog.nielsen.com/nielsenwire/media_entertainment/hottest-june-on-record-for-video-gaming/
- Nikken, P., & Jansz, J. (2006). Parental mediation of children's videogame playing: A comparison of the reports by parents and children. *Learning, Media, and Technology*, 31(2), 181-202.
- NPD Group (2007). *Kids and Consumer Electronics Trends III*. Port Washington, NY: NPD.
- Okita, S. Y. (2004). Effects of age on associating virtual and embodied toys. *CyberPsychology & Behavior*, 7(4), 464-471.
- Ortiz, C., Stowe, R. M., & Arnold, D. H. (2001). Parental influence on child interest in shared picture book reading. *Early Childhood Research Quarterly*, 16(2), 263-281.
- Paquette, D. (2004). Theorizing the father-child relationship: Mechanisms and developmental outcomes. *Human Development*, 47, 193-219.
- Reese, E., & Cox, A. (1999). Quality of adult book reading affects children's emergent literacy. *Developmental Psychology*, 35, 20-28.
- Rideout, V., Roberts, D. F., & Foehr, U. G. (2005). *Generation M: Media in the lives of 8-18 year-olds*. The Kaiser Family Foundation. Retrieved September 10, 2009 from <http://www.kff.org>
- Sénéchal, M., Cornell, E. H. & Broda, L. S. (1995). Age-related differences in the organization of parent infant interactions during picture-book reading. *Early Childhood Research Quarterly*, 10, 317-337.
- Shore, R. (2008). *The power of Pow! Wham!: Children, digital media & our nation's future. Three challenges for the coming decade*. New York: The Joan Ganz Cooney Center at Sesame Workshop.
- Squire, K. D. (in press). From content to context: Videogames as designed experiences. *Educational Researcher*.
- Storch, S. A. & G. J. Whitehurst (2001). The role of family and home in the literacy development of children from low-income backgrounds. *New Directions for Child and Adolescent Development*, (92): 53-71.
- Szechter, L. E., & Carey, E. J. (2008). Gravitating toward science: Parent-child interactions at a gravitational-wave observatory. In L. D. Dierking & J. H. Falk (Eds). *Science Learning in Everyday Life*. Wiley InterScience.
- Thai, A. M., Lowenstein, D., Ching, D., & Rejeski, D. (2009). *Game changer: Investing in digital play to advance children' learning and health*. New York: The Joan Ganz Cooney Center at Sesame Workshop.
- Torr, J. (2004). Talking about picture books: The influence of maternal education on four-year-old children's talk with mothers and preschool teachers. *Journal of Early Childhood Literacy*, 4, 181-210.
- VanKleeck, A., Gillam, R. B., Hamilton, L., & McGrath, C. (1997). The relationship between middle-class parents' book-sharing discussion and their preschoolers' abstract language development. *Journal of Speech, Language, and Hearing Research*, 40, 1261-1271.
- Whitehurst, G. J., & Lonigan, C. J. (1998). Child development and emergent literacy. *Child Development*, 69, 848-872.
- Whitehurst, G. J., Falco, F., Lonigan, C. J., Fischel, J. E., DeBaryshe, B. C, Valdez-Menchaca, M. C., & Caufield, M. (1994). A picture book reading intervention in daycare and home for children from low-income families. *Developmental Psychology*, 24, 552-558.



National Advisory Board Members:

Sandra L. Calvert, Ph.D.	Milton Chen, Ph.D.
Allison Druin, Ph.D.	James Paul Gee, Ph.D.
Alan Gershenfeld	Sharon Lynn Kagan, Ed.D.
Nichole Pinkard, Ph.D.	Delia Pompa
Linda G. Roberts, Ed.D.	Robert Slavin, Ph.D.
Vivien Stewart	Andrea L. Taylor
Ellen Ann Wartella, Ph.D.	

About the Author:

Cynthia Chiong received her doctorate degree in developmental psychology from the University of Virginia. During her graduate studies, she was also an Institute of Education Sciences (IES) fellow where the focus of the program was an interdisciplinary approach to educational research. Her research interests focus on how the design of educational media can affect young children's learning, the way they interact with it, and how parents and teachers use it to teach. She currently works with Wireless Generation, an educational technology company. As a research project manager, she is involved in running IES and NIH funded studies that aim to design and evaluate assessments that can provide insight into children's thinking and can inform teacher instruction.

We would like to thank Ann My Thai, Lori Takeuchi, Gabrielle Cayton-Hodges, and Dixie Ching for their help in organizing the workshop and in offering comments on this report. We would like to thank Susan Zelman and Joaquin Alvarado of the Corporation for Public Broadcasting for their vision in supporting research on innovative uses of digital media.

We would like to thank Tracy Fullerton and Susan B. Neuman, our collaborators on the intergenerational digital games project initiative, and their colleagues listed below:

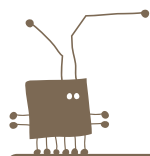
Sam Farmer	Ellen Hamilton Newman
Logan Olson	Andrea Rodriguez
Susana Ruiz	Nahil Sharkasi
Diane Tucker	

This research was supported through a contract with the University of Michigan, made possible through the generous support of the Corporation for Public Broadcasting.



Corporation
for Public
Broadcasting

www.cpb.org



advancing
children's learning
in a digital age

the Joan Ganz Cooney Center
at Sesame Workshop

One Lincoln Plaza
New York, NY 10023
p: (212) 595-3456 f: (212) 875-7308
cooney.center@sesameworkshop.org
www.joanganzcooneycenter.org

sesameworkshop®