FOUR CRITICAL ELEMENTS FOR THE NEXT GENERATION OF GAMES: AUDIENCE, SITUATED LEARNING, ASSESSMENT, & COLLABORATION

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Abstract
This white paper from PBS Kids staff who serve the federally-funded CPB-PBS Ready To Learn Initiative, is intended to contribute to a national conversation on the future of the field of games for impact, that is, games for learning, health, and social change. Taking into consideration the needs of our target audience, young gamers, this paper surveys early childhood education experts, PBS KIDS content producers, and game professionals on the future of digital games. The result is a discussion of how future learning games should be designed, and what they should aim to achieve.

Introduction
One look around proves that technology is pervasive in children’s lives: from Apple commercials featuring young children exploring the possibilities of the iPhone to tried-and-true jokes that “my kid knows how to operate my computer/smartphone/tablet device better than I do,” we live in an age that has not only adjusted to but often even celebrates kids’ usage of digital technologies. Many early childhood educators have embraced digital media, and especially games, as effective tools for teaching and learning, and research has demonstrated their impact and potential.

As producers of learning games and other children’s digital media, PBS believes that the industry has barely scratched the surface of what games can do, be, and achieve for gamers and learners alike. For this paper, we asked our colleagues and partners—esteemed early childhood math and literacy experts, content producers, and technology advisors—what they see for the future of gaming. Their comments were broad, wide-sweeping, and inspiring. Taken together, their thoughts offer a roadmap not for what future games should BE, but for what they should DO, with overlap in four main ideas: 1) the need to create specialized adaptive games that appeal to or meet the needs of specific audiences, 2) the need for games to leverage situated learning experiences, 3) the need for games to offer real-time assessment throughout the play experience, and 4) the need for games to encourage collaboration.

Adaptive Games and Games for Specific Audiences
As we think about designing the next generation of games, it’s critical that we consider the diversity and varied circumstances of young audiences. We need to ask ourselves, how can we make games that will appeal to and teach all kinds of children?

To start, early childhood and math education adviser, Beth Casey, Ph.D., notes the
importance of creating games that appeal specifically to girls. Gamers today are primarily boys, a fact which may contribute to greater gender differences in spatial skills. Computer games can be powerful tools for developing spatial skills and they’ve been shown to improve these skills among girls over time, but most current games (in their form and substance) alienate girls. Future games will need creative hooks to make the content more relevant to girls – for example, by setting games in a story context that involves a quest to rescue someone or something, and minimizes violence and conflict.

PBS KIDS adviser and George Mason University professor, Kevin Clark, Ph.D., agrees. Drawing on personal experience as his children’s team coach, he has witnessed two completely different responses to sports: where his 12-year-old son and son’s teammates are focused mainly on winning, his 9-year-old daughter and her friends are more concerned with the social and aesthetic aspects of the game, such as the cohesiveness of the group and the selection of their uniforms. By extension, Clark argues that we can’t expect boys and girls to behave the same in digital games either. Like Casey, he looks for a future where games are customizable and adaptable based on the individual player, and not adaptive in an "artificial" way (e.g. answer question wrong, go to this branch). Instead, games should use evaluations along the lines of Meyers Briggs and adapt the approach to game activity accordingly.

Where Clark and Casey focused their thoughts on the role of gender in gameplay and game design, PBS KIDS Executive Producer, Bill Shribman, envisions future games for a different audience: those with special needs. To date, PBS’ learning games have largely been focused on traditional education curricula: literacy, math and science. In looking at the future, Shribman sees enormous potential to create games grounded in solid academic research that can help kids with autism, ADHD, and many specific kinds of speech and language impairments. Games for this audience can be tailored to improve kids’ planning, judgment, organization, problem solving, and verbal reasoning (executive function) as well as to improve their social language skills (pragmatics).

Games that promote situated learning
Today, portable devices enable children to play games any time, anywhere. Kids are no longer restricted to a desk with a computer monitor but instead can be engaged in an active learning experience, observing real-world phenomena in real-time while playing a game related to what they’re seeing. PBS technology adviser and Georgia Tech professor, Blaire McIntyre, Ph.D., is an expert on situated learning experiences. He sees a future where learning games will be available at the moment that a player is motivated to learn, leveraging real world physical space (augmented reality) with situated, contextual learning. This is true of training programs where trainees might be confronted with a practical, real-world problem and in-time training would be available to them at the critical moment for learning.

PBS KIDS adviser and Senior Producer from Kidlandia, Sabaa Rehmani, agrees that
connecting the real and virtual worlds to expand problem-solving opportunities and capabilities can increase the number and quality of learning contexts. What’s more, transitioning the collective time, power, and creative potential spent solving problems in virtual worlds to the real world may have an enormous impact on real-world problems. Rehmani offers a hypothetical example: a virtual game about ecology that requires players to actively participate in a real-world environmental rehabilitation activity (such as a beach cleanup) in order to advance to the next level. Upon completing the volunteer activity, a real-life person scans a code that digitally credits the player/volunteer for their effort, and the next level of game play is unlocked. This type of reciprocity – where the self-organizing power of the virtual experience is harnessed and results in real-world action, which then goes back into powering the virtual community – would be a ground-breaking element to the future of gaming.

**Games that assess performance and engagement**

Kids and adults generally play games for enjoyment and often that enjoyment comes from a desire for the game to judge you and report back on your performance. Often this assessment happens during the course of gameplay: a player earns a new life, her points value increases, or a favorite character celebrates his achievement. These rewards are talismans of progress and they are rather generic. The challenge for game designers lies in making more calculated assessments (based on exposure, practice, and mastery of specific learning goals) and making those assessments accessible to parents, teachers, and caregivers.

Clark suggests an “automatic assessment engine” for the kind of evaluation that educators and parents will expect of future game experiences. Just as newer cars use digital gauges to indicate oil levels instead of the old dipstick test, games need similarly easy access to tracking and assessments. Such assessment will breed motivation: instead of collecting weapons and armor, kids collect skills that open up new play, motivated by their increasing mastery.

Along these lines, it is important to have clear benchmarks for what constitutes progress in a game experience. A successful education assessment engine will be one that is seamlessly and simultaneously developed with the game content. McIntyre notes that current and future games must be age-appropriate, challenging kids at their zone of proximal development: “Games need to provide the appropriate level of assistance and then remove the scaffolds as players improve. This way, we can more accurately assess a game’s ability to teach, not just its potential for engagement. Quality game developers are needed for this work so that well-designed games with clear educational goals can be researched.”

**Games that encourage collaboration**

Many advisors discussed the need for games that spark collaboration, and research that further explores the social aspects of gaming. As mentioned earlier in this paper, girls especially might be drawn to the more social aspects of gaming. PBS KIDS sees
collaborative gaming as an area for future growth for all content producers of kids’ educational games. In an effort to bring this concept to reality, we’ve started to explore the issues that arise when considering collaborative games for a young audience.

PBS KIDS producer, Christine Zanchi, has seen collaborative games inspire unexpected, spontaneous sharing -- valuable learning conversations that she calls “content talk.” For example, in the playtesting of the PBS Kids’ *Martha Speaks* vocabulary app, several children, ranging in age from 4 to 7, were playing the same game in the same room. Although each child had his or her own device and was at different points in the game, kids often shared and talked about what they were doing – engaging in “content talk.” This unplanned discussion, a hybrid of parallel play and collaboration, allowed them to talk about the target vocabulary words as they encountered them, and enriched the learning experience.

The challenge for designers (and facilitators) is in trying to engineer and inspire content talk and collaboration, especially when kids are collaborating virtually. There is a need to explore how to scaffold the conversations about the content and get kids to truly collaborate -- especially across age bands. More supports are needed to facilitate this learning dynamic, especially as kids are so focused on their own performance – including models for how to spark meaningful content talk among kids, and examples for adults (teachers or parents) that demonstrate how to elicit and facilitate productive content talk.

**Conclusion**

There are unlimited possibilities for where to go next in the realm of gaming for young children. We’ve touched upon just four areas that are top of mind for PBS KIDS and our partners. While there is much more to explore, it is clear that the growing affordances of technologies and the ability to customize games can be combined with real-time assessment and collaborative models to offer a valuable addition to the gaming landscape.

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**Bio:** Jennifer Rodriguez is the Senior Content Manager of Ready to Learn, serving as the primary producer contact and usability research coordinator in the development of multiplatform educational games. In her current work she is leading the development of mobile apps (iOS and Android), html5 features, augmented reality games, and 3D-rendered games. Jennifer is a graduate from Harvard University's Technology Innovation Education Masters program and Harvard University.

**Bio:** Jeremy Roberts is Director of Technology for PBS KIDS Interactive, where he focuses on delivering cutting-edge educational gaming experiences to kids aged 2-8. Roberts is currently working with content properties such as CURIOS GEORGE, DINOSAUR TRAIN, THE CAT IN THE HAT KNOWS A LOT ABOUT THAT! and SUPER WHY! on multiple platforms including web, mobile pocket and tablet, whiteboards, interactive tables and interactive video - as well as augmented reality for web, mobile and tablet. A physicist by training, Roberts' experience in technology over the past 15 years ranges from bringing the AOL Entertainment, Music and Video Games channels to life in the early '90s, to pioneering online video and mobile content delivery for PBS in the early 2000s, to coding physics simulation software for the astronomy department at George Mason University.