Research on the science of learning illuminates the power of games for helping students realize meaningful goals, especially when designed to support an engaged and purposeful learner. It further shows that the power of these spaces for learning is bound up in their potential to enable powerful interactions not simply within, but around games—among peers, with teacher support, and when situated alongside other curricular materials. Although learning innovations such as videogames are powerful, especially when informed by what we know about how people learn, they alone are insufficient to bring about intended outcomes. Innovations designed to enable potential need to operate less as “technological fixes” to be disseminated and more as catalysts that enable, unlock, and amplify local potentials. Implementation models that empower school sites, and that are sensitive to the challenges of ecosystem integration are more likely to achieve meaningful learning outcomes.

The context of learning matters, and reasons for learning are as important as what one learns.

- There is little scientific support for models of learning that are based on transmitting expert content into the heads of passive learners, and much research showing that content is situated and that one’s reasons for learning are central to what one learns (Bransford, Brown, & Cocking, 2002; Engle, 2006; Goldstone & Son, 2005; Greeno & MMAP, 1998; Gresalfi & Barab, 2011; Lave & Wenger, 1991).
- Learning potential is not simply a property of individual minds, but instead is spread across those conditions in which learning occurs and one’s reasons for learning, and under the right conditions the same learner can succeed (Barab & Plucker, 2002; Barron, 2006; Boaler, 2002; Bransford, Brown, & Cocking, 2002; Davidson, 1996; Dweck, 2006; Gilbert & Yerrick, 2001; Greeno & Gresalfi, 2008; Hand & Gresalfi, 2015; Lee & Hoadley, 2007).
- Schools need to become places where students come to see academic content as a set of powerful tools to be used to accomplish personally meaningful goals, building the essential literacies and cultivating the critical dispositions required for meaningful 21st century lives and careers (Boale, 2002; Barab, Gresalfi, & Ingram-Goble, 2010; Gee, 2003; Ito, 2008; Hattie, 2008).

The models of learning are changing, but formal learning institutions are not.

- Technology, and especially games, has transformed all aspects of our life except for formal learning institutions, but has the potential to establish powerful learning environments (Cuban, Kirkpatrick, & Peck, 2001; Gee, 2003; Ito, et al., 2013; Friedman, 2006; Madden, Lenhart, Cortesi, & Gasser, 2010; Pink, 2006)
- Schools and teachers are struggling to navigate this rapidly shifting and complex landscape, with instructional methods of most classrooms today looking quite similar to schools of 30 years ago (Collins & Halverson, 2009; Darling-Hammond, 2010; Ravitch, 2011).
- Students need curricula that leverage what we know about how people learn, and that take advantage of available interactive and immersive technologies such that all learners come to see themselves as capable of achieving at high levels when they invest the effort (Gee, 2003; Ito, et al., 2013; Madden, Lenhart, Cortesi, & Gasser, 2010; Mueller & Dweck, 1998).

Prepared by Sasha A Barab, Arizona State University
Teachers need research-based platforms and curriculum that genuinely engage students, that take advantage of the benefits of digital and blended learning, and that still empower teachers to adapt these new technologies into their daily teaching practice.

- Game-based learning environments are one technology that can be used to build rich learning contexts in which academic content has an obvious purpose, creating a place in which what you know is directly related to what you are able to do and, ultimately, who you become (Barab, Gresalfi, & Ingram-Goble, 2010; Squire, 2006). Games can enable players to step into different roles (e.g. scientist, explorer, inventor, political leader), confront a problem, make meaningful choices, and explore the consequences (Clark, Tanner-Smith, & Killingsworth, 2014).

- Well-designed games and game-infused experiences offer a delicate balance of challenges and rewards that can drive deep levels of engagement and time-on-task, enabling players to advance at their own pace, fail in a safe and supportive environment, acquire critical knowledge just-in-time (versus just-in-case), change based on feedback, and use knowledge to develop mastery (Gee, 2003; Squire, 2006).

- Achieving transformative impact requires that those individuals at the implementation sites are invited, inspired, and enabled to become innovators responsible for co-producing value, meaning, and outcomes for their local context. It requires:
  - Staff empowerment, local adaption, and stakeholder alignment foster deep investment in owning the implementation process (Foster-Fishman, Salem, Allen, & Fahrbach, 1999; Knight, Cutcher-Gershenfeld, & Mittleman, 2015).
  - An ongoing commitment to data collection, system optimization, and continued resource allocation to ensure that lessons learned are fed back into the system to cultivate impact (Barab, 2016; Epstein & Yuthas, 2014).

Game-enabled services can be a human accelerator, providing rich learning experiences.

- Games have the potential to connect what one knows, what one sees, what one does, and who one becomes in ways that are associated with powerful learning frameworks (Barab, Gresalfi, & Ingram-Goble, 2010; Shaffer, 2012)

- Games as a learning technology are interactive, participatory, and hugely personal, providing a delicate balance of challenges and rewards and allowing learners to advance at their own pace and persist in the face of failure (Dweck, 2006; Gee, 2003; Klopfer, 2005)

- Within games, learners can enter ideological worlds in which they become protagonists, take on roles, make consequential choices, and fail safely with the chance to alter performance based on feedback (Barab, Pettyjohn, Gresalfi, & Solomou, 2012; Squire, 2006; Steinkeuhler, 2008)

There needs to be a deeper appreciation for the distinction between outputs and outcomes, and what it takes to achieve outcomes.

- Schools often maximize the achievement of learning outputs (e.g., standardized test performance, following a set of procedures, rapid information dissemination), which often occurs at the expense of longer term outcomes such as students who are deeply invested in learning and are connecting what they are learning to what they can do with it (Chinman, Imm, & Wandersman, 2004; Clark, 1990; Funnel & Rogers, 2011; Hollifield, 1986).

- Achieving transformative outcomes involves building innovations on clearly
articulated logic models that specify cause and effect and consider unintended consequences of maximizing for immediate outputs (Backer, 2001; Stokes, Walden, O’Shea, Nasso, Mariutto, & Burak, 2015; Kellogg Foundation, 2001; Taylor-Powell & Henert, 2008)

- While bounded games can be used to maximize outputs, meaningful outcomes are realized through interactions that happen around the game and not within the game, and involve prepared facilitators, curriculum integration, and peer collaboration (Gee & Hayes, 2011; Clark, Tanner-Smith, & Killingsworth, 2014; Wouters, Nimwegen, van Oostendorp, & van der Spek, 2013)

The power of any innovation provides a potential, unlocked through ecosystem integration.

- Innovations for impact rarely serve as “technological fixes,” and instead require some level of active participation and engagement of those using the technology, more as catalysts that enable, unlock, and amplify local potentials (Sarewitz & Nelson, 2008; Shirky, 2008; Toyama, 2015).
- While we can build technological innovations to scale these insights, the potential of any “product” is unlocked through positioning as a tech-enabled service that enables ecosystems to recreate fruitful learning conditions (Barab, 2016; Barben, Fisher, Selin, & Guston, 2008; Guston, 2014; Penuel, Fishman, Cheng, & Sabelli, 2010)
- Successful integration of any transformative technology requires ongoing evaluation and professional development, responding to the challenges and opportunities as they are evident within and for a particular context (Bork, 2014; Epstein & Yuthas, 2014; Guskey, 1991, 2002; Ingvarson, Meiers, & Beavis, 2005).

References


Learning, Innovation, and Ecosystem Integration

Practice, 8(3), 381–391.