From Knowledge to Experience: Making Space for Games in the Second Millennium of the University

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There is great interest in developing games for higher education. However it is not at all clear if education will or can accept games. This white paper asserts that research exploring how education systems can adapt to better utilize the potential of games is as important as creating learning games. It will be shown that games can not only support learning, but re-energize the university for the 21st Century. In order to understand how games can deeply impact higher education it is important to first examine two modern challenges faced by universities; one stemming from higher education's historical origins of universities, and the other from education's own success.

The fact that from their inception nearly a millennium ago universities were designed to transmit knowledge presents modern-day challenges for higher education. The university as a societal institution can trace its lineage back nearly one millennium to the places scholars travelled to in order to obtain the information they needed to become educated. The word "university" itself is shortened from the Latin phrase "*universitas magistrorum et scholarium*" which translates as "community of masters and scholars". This location-centric model made historical sense when oral recitation of written texts, hand-copied by students, was an efficient and massively parallel means of information transmission. Before the advent of the printing press information was an extremely valuable commodity- a single book cost as much as a small farm. While the knowledge-centric structure of universities made sense when information was scarce, localized, and expensive to obtain, it is serving to undermine their function in the information age [1]. Unfortunately, nearly all efforts at change retain the primacy of knowledge. From the emergence of courses and the curriculum in the 16th century [2] to modern efforts to integrate videos, on-line courses, or games, reform efforts address ways to reorder, redefine, acquire, retain, and/or transfer knowledge. However as will be explained later, the real strength of games is not in knowledge transfer.

Another challenge arises from universities' resistance to change, which stems from its role as a guardian of tradition and its success in enculturation. We are all products of similar educational systems and are conditioned to think about education within the ideas, metaphors, symbols, or memes of that system. If you don't believe this sit in on a discussion of education reform and listen to how participants frame reform. Our own educations have defined, constrained, and molded us so completely we cannot think about the system that educated us except within the bounds of that system. There is, however, little evidence the existing system is optimal for current needs. By accepting structural artifacts of education—classes, grades, teacher, homework, and credit hour—as constraints, we limit our ability to innovate. Furthermore since education reflects societal values not only are new models difficult to imagine, they face resistance in being accepted.

These challenges are structural, not pedagogical; they arise from basic assumptions of how universities should be organized that are deeply rooted in individual beliefs. Given the history of past reform efforts, it is not probable that games, or other reform efforts, can significantly impact education unless the challenge of structural change is recognized and addressed. Large scale reform is critical, however, since the "community of masters and scholars" has great impact on society. Research and technologies that originate in universities drive economic growth, and industries demand an increasingly educated workforce. Universities remain open repositories of specialized expertise which allows individuals, institutions, and societies to function in a complex world of interconnected systems.

This paper examines how ideas drawn from games, particularly the genre known as role playing games, may help catalyze structural change. The fact that many people, especially parents and teachers, see games as antithetical to education often obscures their great potential for learning. While games can help engage students in traditional schooling, they also serve as sources of symbols, ideas, and memes. Structural change needs to be undertaken not by a top-down reform effort, but rather by cross-breeding or "hybridizing" universities with disruptive ideas from sources such as games [3]. Such hybridizing will enable universities to protect those aspects of academic culture that should resist rapid changes in society—scholarship and archival knowledge creation—while allowing educational missions to adapt more rapidly to the needs of society, the workforce, and incoming students. This paper first identifies three separate learning spaces where games can have impact, then discusses specific "leverage points" amenable to hybridization by games by makings specific suggestions for hybrid programs and identifying future research challenges.

Learning Spaces

Learning takes place both in and outside of formal school environments. While there are many possible categorizations of learning environments, the three composite spaces defined below—differing chiefly in levels of engagement and accountability—help identify where in the education system games can have significant impact.

- The "identity playground" resembles an open air market in spirit, but not form. Individuals are free to wander the market, and sample products, services, or ideas. The space, enabled by the internet, helps people self-edit their internal story, publicize themselves, or explore new identities or affinities. Typically people strongly preserve rights to privacy, participate or share selectively, and tightly regulate how much they choose to interact. Thus while this space is not often considered in education, explorations can lead to deep engagement in more formal learning experiences. Games excel in this space.
- The "apprenticeship"—including traditional school, on-line learning, and some social organizations—requires longer-term engagement. Individuals identify as learners, engage in personal interactions with other learners and mentors, and put in consistent, structured effort to achieve learning goals. Typically learning goals are externally set by experts and focus on content mastery, although more user-driven apprenticeships have recently emerged including on-line forums devoted to topics from game mechanics to automobile mechanics, physical maker-spaces, and the socio-political forums typified by the Occupy movement. Games are starting to gain a foothold in this space.
- In the "profession space" an individual may at times be a learner but their predominant identity is that of a contributor to a larger organizational goal. Here individuals identify with the organization and are valued for their contributions and expertise. Because this space is socially mediated by large numbers of past and present contributors, it typically conservative in outlook, slow to change, and individuals are expected to engage deeply with, and adapt themselves to, the space. Games' impact here is minor and tenuous.

While these spaces are fundamentally different, they do overlap, and individuals occupy multiple spaces and transition between these spaces on a regular basis depending on what identity they are currently assuming. The structure of traditional education implies a well-defined and linear path from playground to profession, but such simplicity is an illusion. In reality individual pathways are often nonlinear, parallel, and non-continuous. One advantage of games as learning models is that they capture the reality of how an individual moves through these spaces better than do traditional, linear views of education. The best opportunities for integrating games and education lie on the boundaries between these spaces.

Leverage Points

This section discusses four opportunities to hybridize the structure of education by games so game's potential in learning can be fully realized.

1] Create porous boundaries at the interface between the identity playground and school space. As discussed above, games excel in the identity playground. They are excellent at engaging players, allow rapid learning of game mechanics, and provide scaffolding so even relatively young learners can gain competence on complex tasks. However, the learning goals of the apprenticeship space are not aligned with what is learned in most games. While much work is being done to develop games for learning, research is also needed on how best to restructure educational environments to smoothly interface to games. There are a great number of research questions at this interface: Can games identify players with a high level of engagement and help transition players to a local apprenticeship space where they can further develop their interests? Must such transitioning be done in the game environment itself, or will developing less expensive add-ons to games be equally effective? What induces people to make the commitment required to move from the playground to the apprenticeship, and how can games best provide inducements? What changes to the structure of college are needed to support such transitions?

One area with great potential is the interface between games and informal learning environments like museums and maker spaces that allow skill acquisition through self-driven exploration. Ideas like badges for learning, perhaps obtained through gameplay, fit naturally in this interface, and do ways to significantly reduce the cost of education by developing common pool resources [4]. Fundamental research is needed to address what types of learning currently done in formal learning environments is better supported in games due to their ability to

promote repetition and drill, and what types need to take place in a more hands-on environment where direct, hands-on instruction is available (the "community of masters and scholars").

2] Gamify education to better align educational structures with research on learning. The last several decades have produced research on learning that provides insights on how to meaningfully improve learning systems [5]. Research has shown the strong effect of motivation and environment on learning, the effectiveness of collaborative learning, the importance of context, the benefits of active engagement in learning as opposed to recitation, the value of immediate feedback on progress, and the importance of individual pre-conceptions and prior knowledge. Unfortunately, since traditional universities are structured for knowledge-transmission it has proven difficult to widely implement effective, research-based teaching practices. Since games, particularly the role-playing genre, have structures that are highly supportive of effective pedagogies, one leverage point to improve college is to gamify education.

For example in school while both context and content are typically defined by experts for novices, research shows novices don't understand context or content the same way experts do. In games context is story-driven and emergent; i.e. depends on player's advancement in the game. How can the apprenticeship space adapt such emergent exposure paradigms to promote self-discovery? In school students are often required to work alone, but games require cooperation among individuals with diverse talents if players are to succeed in difficult challenges. In this way games resemble the profession space more than schools do. In college students become siloed by choosing a major, often with little knowledge of the profession, but otherwise have little control over the learning experiences they undergo. Players in games, on the other hand, purposively develop a character with specific abilities and the player is constantly given choices on which abilities to strengthen as games progress. Can hybrid college-game models be developed, perhaps by replacing some courses with "quest chains"? Adapting ideas like quest chains from games to schools offer great potential to personalize learning. Compared with courses quest chains provide a more "fine-grained" approach to develop learning modules that can be easily shared between universities in a way that courses can't, allowing cost-effective scaling of educational innovations. This space is just starting to be explored, and basic research is needed on what the optimal balance between self-guided and structured learning is for different groups of students, what types of learning are best supported by traditional courses, game-like learning environments, and games themselves.

3] Draw from games to re-invent how education systems credential learning. The credentialing function of universities is critical to the individuals who invest in degrees and employers who use academic performance as a proxy measure of employability. Credentials such as transcripts and diplomas reflect the knowledge-transmission structure of the university and are, at best, highly simplified proxies for actual learning. In fact most accreditation agencies do not allow grades to be used as measures of student learning. Games offer ideas for alternative credentialing that can help universities more accurately quantify learning across multiple dimensions and create more porous boundaries between the apprenticeship and profession spaces. For example in the profession space possessing or transmitting knowledge is of comparatively little value if one is not able to access, manipulate, and use knowledge. In other words, it is not the knowing in and of itself, but using what you know to do something—knowledge in the service of gaining experience—that is increasingly important. Experience is subtly different from knowledge since it is first-hand; gaining experience means having done something to the extent you were involved, engaged, and able to learn from reflection. Games have developed elaborate systems to measure experience within the game environment and motivate players to undertake actions that provide experience.

One potentially disruptive innovation is to adapt the systems role playing games such as MMORPG's (Massively Multiplayer On-line Role Playing Games) have created to track gameplay for credentialing student advancement [6]. A simple example with potentially transformative impact would be to eliminate grades and instead assign experience points that were proportional to the difficulty of assignments and how well the student performed. Such a change would remove the stigma of failure, permit simplified and direct assessment of learning outcomes, allow academic credit for what are now extracurricular activities, and provide immediate feedback to students on progress through degree programs. Research is needed to better understand the spectrum that lies between affinity-driven and content-driven learning models, and the places on this spectrum that are best for developing both expertise and the ability to think abstractly. Longitudinal studies can help policy makers understand long term outcomes as students move from the apprenticeship to profession spaces.

4] Explore how hybrid game-university models can help scale education cost effectively. The rising cost of higher education, particularly STEM education, undermines growth and diversity of the workforce. The current university system seems unable to scale cost-effectively. Scaling is currently hindered by several factors: the fact that courses (the smallest unit of learning) are not transportable between universities, academic credit is assigned by the relatively coarse measure of credit hour, and universities' quest for institutional status [7]. Existing alternative models—MIT's open courseware certificate, badges, and the Cisco Networking Academy—are not widely integrated into existing degree programs.

Can hybridizing education with ideas from games improve scalability? Consider an education confederation of universities, industries, schools and NGO's where students earn experience points rather than grades, and graduate when they reach 40th level. Students earn experience points in traditional, structured courses at the university as well as through quests, internships, and club activities. Just as in games, the learning opportunities open to students depend on level and completion of prior quests. Such a model bypasses two hindrances to scaling- university ownership of credentialing and the coarse-grained nature of assigning academic credit. Since students have a variety of pathways to graduation, education experimentation and innovation is encouraged. As in games, successful pathways are shared and widely emulated, allowing students to rapidly adapt to emerging workforce needs without the need for cumbersome top-down curriculum reform. Research is needed to explore the business models of such hybridizations and novel ideas like experience point exchange ratios between schools. Although it would take significant work to develop quest chains, accurately assess learning outcomes, and understand where structured versus un-structured learning is most beneficial, existing MMORPG's offer rich examples and data-sets that can inform intelligent hybridization.

Concluding Thoughts

The education eco-system is being challenged by an array of disruptive innovations, including games. Such disruption both threatens universities and offers new opportunities to improve education. This paper asserts that innovation is needed on *both* sides of the game-school boundary to intelligently and wisely interface games with education. Failure to bridge this divides puts education on the losing side in the battle to engage America's youth. Success creates scalable education systems, allows students to transition seamlessly between playground and profession, and allows education to rapidly adapt to societal needs.

[1] Noam, E., *Electronics and the dim future of the university*. Science, 1995. 270(5234): p. 247-249.

[2] Goodson, I., C*hariots of Fire: Etymologies, Epistemologies and the Emergence of Curriculum, in The Making Of The Curriculum: Collected Essays*, I. Goodson, Editor. 1995, Taylor & Francis: London.

[3] Christensen, C. M. and Eyring, H. J., T*he Innovative University: Changing the DNA of Higher Education from the Inside Out*. 2011, Jossey Bass: San Francisco.

[4] Ostrum, E., *Governing the Commons, The Evolution of Institutions for Collective Action*. 1990, Cambridge University Press: New York.

[5] Bransford, D. et. al., How People Learn: Brain, Mind, Experience, and School, J. Bransford, Editor. 2000, National Academy Press: Washington, DC.

[6] c.f. http://cheville.okstate.edu/Thoughts/SecondMillenium.pdf; http://ra.okstate.edu/cheville/thesecondmillenium/enablingchange.html; http://ra.okstate.edu/cheville/thesecondmillenium.html

[7] The issue of status is critical. Status drives investments since correlates with alumni giving, the value of the degree, tuition, and faculty salaries. Additionally it inhibits replication of the most successful programs since status and scarcity are causally related.