Productive Gaming: The Case for Historiographic Play

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Recent years have witnessed unforeseen leaps in technology, which many have argued are ushering in a new media paradigm (Games, Learning, and Society, 2005/2007). Video games are an excellent site to examine in order to understand this new medium, because games are natively digital. Video games are emblematic of the current popular culture we live in that has a distinctive zeitgeist. Examining games, we see three overriding themes that demarcate the modern media landscape:Video games are built around a logic of simulation, one that is about possible worlds, rather than inspiring oratory, coherent linear arguments, or purely visual imagery. Games are worlds we explore, and learn within, through interaction and performance. Video games are participatory, in that players have the opportunity to shape the medium itself through (a) production within game worlds (many of which are filmed and published on the Internet), (b) production with game tools (such as modding), and (c) gaining membership in affinity groups, such as gaming clans, guilds, clubs, and so on, to support one's gaming. Video games provide an aesthetic experience. Video games offer us opportunities to do new things and take on identities that are unavailable in the real world. As Galarneau writes, their potential impact in education may be best thought of as producing *transformative* experience (Galarneau, 2005 *GLS Proc.*).

A mature theory of game-based learning, we argue, will take into account the underlying principles by which they work as learning environments "naturalistically", or "in the wild," to borrow Hutchins's (Hutchins, 1995) term. Modern video games, with their myriad of toolkits for modding and interface editing, have increasingly evolved from being compelling mediums that merely engage users passively into spaces (and communities) that empower users to willfully create and disseminate content (Jenkins & Squire 2003; Steinkuehler & Johnson, this volume). As such, video games are not only a pervasive popular culture media, but also form some of the central discourses around 21st century pedagogical practices and what it means to teach or learn in a globalized future. The growing body of literature around video games and learning suggests that games are powerful models for teaching and can potentially affect how people can and ought to learn in the ever-changing landscape of knowledge (Shaffer & Gee, 2006,). A key challenge that remains for educators is how to produce pedagogical models that leverage the strengths of the medium, yet meet educationally valued goals. Restated, we know that players learn through participation in MMOs such as World of Warcraft (Steinkuehler, 2005, Nardi et.al, *forthcoming Proc.,* Galarneau 2006), and that educational interventions that use game technologies (such as networked 3D worlds) can be effective, but how might we harness the simulation, participatory, and aesthetic dimensions of games for intentional learning?

This paper will examine the potential of video games as a learning tool given their *productive* capacity for content creation and dissemination. Using the *Civilization III* game engine (a turn-based historical simulation-strategy game), it explores whether a group of disadvantaged kids playing a series of historically themed scenarios can become the kind of "producers" of media and knowledge described by Squire and Giovanetto (in press). It seeks to build on the participatory nature of gaming communities (most often virtual) which function for many players as "*third spaces*" – spaces that emerge out of coherent and shared history of information and tend to perpetuate game practices beyond virtual game worlds and foster social interactions beyond

homes and workplaces (Steinkuehler & Williams, 2006). As of this writing, our community is primarily face-to-face, although we are exploring ways to extend the community into virtual spaces as well.

Simulation in World History

When it comes to history teaching in schools, there has remained a persistent tradition to present history as a body of facts about people and events in the past extracted and isolated from the larger contexts in which they existed, laying importance on *getting the right facts from textbooks* rather than how and why they should care about these facts. Research on how students learn history through reading textbooks reveals some of the limitations of this approach. For example, Beck and McKeown (Beck & McKeown, 1989) found that students lacked sufficient background understanding to make much sense of text as presented in textbooks, and as a result, produced (sometimes fascinating) hybridized historical interpretations, such as 17th century colonists arriving on to the Americas on ocean liners. Students lack situated experience of historical events and eras to draw any meaningful interpretation of the past.

The challenges for world history educators are even greater. World history, the study of global cultures and civilizations, seeks to capture and communicate over 6000 years of recorded human history, across all six inhabited continents. Whereas much of history has been organized around political units, world history is organized around natural resources (such as salt), social institutions (such as slavery), or historical questions (such as why have major civilizations collapsed?). Teaching world history to students is no small task, particularly when a majority of students fail to even correctly place major civilizations on a map. Ross Dunn (Dunn, 1996) argues that in order to avoid this "names and dates" problem, educators might seek to teach "patterns of change," broad historical patterns and trends that can be used as frameworks for understanding human history.

Historical simulations are one way to provide students a framework to think about history that stresses not facts, but how historical forces operate and interact (Staley, 2003). Simulations and models simplify the infinitely complex past into a form that enables students to make insights into basic relationships. Simulations offer useful simplifications of complex situations and are often "imperfect replica" of the real. Learning through modeling is an iterative process of modeling the past, drawing inferences based on them, comparing them to the historical record, and modifying the model as necessary. This iterative cycle of abduction shares very little with how history is normally taught in schools, but shares quite a bit with how players learn through video games.

Learning through video game -based simulations and virtual modeling destabilizes traditional categories and relations. Because video games enable us to learn through having agency within a system, they demand us to shift perspectives in approaching history, enabling designers to make historiographic choices about how systems are represented, and what sorts of alternate hypotheses and interpretations of the past are made available (Staley, 2003). This pedagogical approach decenters the standard text (or teachers' notes) from the center of the knowledge network, and places students' questions, hypotheses, and fantasies at the center. From a model-

based learning environment perspective, learning entails more than mastering one long narrative of facts; learning is about developing the ability to ask good questions, draw inferences from the model, identify points in the model that can or need to be modified, and then marshal resources to refine the model. From a socially situated perspective, the goal here is not to learn "all there is to know about one true model", or even, to "develop one true model", but rather, to engage in modeling practices within a knowledge building community where knowledge is contested, constructed, and defended.

Modding with *Civ3*

Commercial computer game Civilization III (or *Civ3*) is an interesting artifact by which one can begin testing these ideas. In *Civ3*, players lead a civilization (the standard game goes from 4000BC to the present), making choices about how to use land resources (such as where to build cities), where to invest resources (such as in "guns vs. butter"), what kinds of infrastructure to build, and how to manage one's military. Unlike many strategy games, which are generally just about identifying resources and then building war units, *Civ3* does reasonably good (albeit simplified) approximations of economic systems, political systems, domestic systems, and military systems. The game can be won through diplomatic, scientific, cultural, or military means. Although the game is (obviously) a simplification of reality, the model does contain 10,000s of variables, and takes months, if not years to master.

Civilization comes with an editing toolkit- *CivEdit* that allows players to create historical scenarios. Through the editing toolkit players can modify game rules or define new ones that can simulate specific historical events or patterns in the past. Typically, a game in *Civilization III* starts with an equable distribution of power among civilizations- meaning different attributes (such as, militaristic, commercial, industrious, expansionist, religious or scientific) of a civilization make it strong or weak in its own way. A *scenario* in C*ivilization III* is depiction of events or an era (that can either hypothetical or historically accurate, as one wishes it to be), spanning over the scale of time. For example, using the game toolkit, players may create a scenario for growth or decline of the Roman civilization, or a scenario depicting European conquests in South Africa. Players can modify almost every attribute of the game, such as a civilization's economic growth, population growth, cost of building new infrastructure, cultural expansion and so on. Thus, the concept of a strong or weak civilization, is not an in-built feature in the game, but viewed as a consequence that emerge from manipulating certain variables and conditions, such as *cost of wonders* or *pace of technological research* that affect different attributes of a civilization. In other words, simulating historical patterns or events is about choosing the relevant variables to manipulate, hypothesizing about effects of manipulating each rule and describing (or setting) them in *CivEdit*; in nutshell speaking the language of *CivEdit* to control the behavior of a scenario in *Civ3*.

Past research on *Civ3*, conducted mostly in school contexts, has emphasized, when used in the context of classroom, playing *Civ3* can lead to game practices that foster systemic model-based understandings about history (Squire, 2003, 2004). Not only do players learn specific terminology (names, places, and dates), but they also develop understanding about how the model itself works as a means for representing history. Some players turned the game into a colonial simulation tool, using it as a context for asking under what conditions might have Native

Americans held of European colonists. Others were interested in playing as Egypt, and seeing if they could fend off the Greeks, Persians, and Romans. Still others played competitively, seeking to play the Civilization most advantageous for world domination, given their play style (some prefer cultural expansion, as opposed to military expansion, for example). Most obviously, social studies became a meaningful subject for students, as the game invited their participation into manipulating history as a system. More advanced players developed models to think about history with, and used it as a tool for thinking through contemporary issues.

Open-ended games such as Civilization III provide rich contexts for learning through recruiting players' identities, providing a context for creative expression, and supporting the development of collective intelligence (Gee, 2004; Steinkuehler, 2005); however, bringing games into classrooms and settings poses structural and pedagogical challenges especially in terms of managing instructional time, integrating learning activities into the curriculum, and covering state-mandated content. Games' complexity can at times lead to frustration, and resistance among kids in the process of appropriation (Squire & Barab, 2004). Studies of learning outside of school contexts emphasize the importance of novice-expert collaborations in joint problem-solving activity as a means of managing this complexity. Steinkuehler shows how advanced players make many of the same instructional moves as advanced teacher-mentors (regardless of age): They identify salient parts of a problem situation, model expert practice, provide just-in-time feedback, gradually shift control to learners, and transmit particular values, or ways of seeing the world to novices.

Such examples suggest that games can be an effective medium for learning, but are hard pressed to leverage many of the instructional affordances of the medium within classroom contexts (Squire, 2004, Squire & Barab, 2004). Might after school programs be created around alternative value systems, leveraging aspects of gamer discourse in order to enable players to develop productive identities as historical simulation game players? Can these practices result in both "traditional" academic learning (names, places, and dates), as well as the productive knowledge generation skills indigenous to game communities (and increasingly valued by educators (see 21st Century Thinking Skills, cite)? What might the pay-off of these activities be for participation in other settings?

Connecting Indigenous and Designed Gaming Practices

This paper is part of a longitudinal, 2-year design-based research study investigating the potential of learning communities constructed around *Civ3* to help disadvantaged students develop new identities as producers as well a consumers of historical simulation games. It seeks to design a game-based learning environment that from a physical and organizational standpoint can function as a *third space* for learning outside of the school (Squire et al, in press.). It then seeks to understand what learning occurs, and identity trajectories of learning as a result. First, it seeks to unpack the practice of historical modding with *Civ3* by interviewing expert *Civ3* modders to understand how they use the tool for historical modding, what skills go into successfully creating a *Civ3* mod, and to better elucidate the relationship between game play and game production in expert players. Next, the paper turns to World Civilizations, an after school club designed for the explicit purpose of helping disadvantaged students develop identities (knowledge, skills, attitudes, beliefs, and value systems) as world history gamers.

Expert use of Civilization III for creating <mark>historical simulations</mark>

Although the existence of gamers using *Civ3* as a <mark>modding</mark> tool has been noted, and even supported by the developers of Civilization (Soren Johnson, lead designer of CivIV has an academic background in historical simulations), there has been no academic study of this practice. Historical game-simulation, while presumably similar to historical simulation creation, adds the wrinkle of designing scenarios that are interesting as games, historical situations that illuminate historical forces and issues, lead to interesting sets of decisions, and enable players to experience salient aspects of historical eras. To date, no research has been conducted on what kinds of cognitive work go into historical game production, how this unique practice emerges in players, nor its potential as a model for expert game play / production tied to academically valued practices.

To begin answering these questions, we studied expert *Civ3* mod developers. Specifically, we observed as they built mods, conducted think aloud studies while they edited mods, interviewed them about their practice, and analyzed historical scenarios they created. Findings from this study suggested that the language recruited by *Civ3* mod creation recruits specific forms of thinking about factual knowledge in history that might be more meaningful than mere memorization of facts. Players used game mechanics and language, such as the role of military alliances, building city improvements or great wonders, gaining power through conquests or through cultural invasion as tools for thinking through historical events. Within the context of <mark>modding</mark>, these tools deeply remediated their experience and analysis of history. Implications to history teaching is that it ought to focus on curriculums that nurture designers who get the opportunity to make sense of history through creating and willfully regulating simulations of historical events.

The analysis of expert <mark>modding</mark> revealed three particular game practices core to modding, each of which suggests an interesting form of "academic play" worth exploring (and perhaps replicating) in intentional learning environments:

a) Expert players modified game scenarios to make them more historically relevant through repurposing and manipulating existing game units and features to compensate for features absent in the "stock" game. In discussing their play, these player/ designers referred to facts (or events from real scenario) and used them to describe (and sometimes redefine) game attributes. For example, in creating a scenario based on the world map, one of the participants remarked, "triggering barbarian uprising simulates [quite accurately] the Mongolian presence around China in 4000 B.C. Mongolians invaded China frequently to systematically devastate Chinese empire." He repurposes barbarian uprising to simulate Mongolian oppression in China around the 4000 B.C.

b) Players used Civ3 as a recursive design / play space where they iteratively play and redesign. These players' interest in scenario design stems from identifying limitations in the core game and then creating their own game scenarios to result in an "idealized" version of the game. These players use game play as a space for refining their idealized game and testing their ongoing hypotheses over extended periods of time. For example, when asked why would one want to use the game-editing toolkit, the participant said, "I use it (Civ3) as a history simulator. I would I

come up with a wish list of stuff I want to change while I play the game. Scenario creation is not about accurately or inaccurately simulating history, but [constantly] modifying the scenario to bridge the gap between my hypotheses and the way *Civilization III played* them out".

c) Game play, for expert players, consists of seeking to create emergent historical phenomena through manipulating underlying variables. These players create hypotheses about what historical events will emerge when global forces are altered in particular ways. This manipulation of events is (necessarily) mediated in terms of the game's pre-existing commands and variables. For example, in a scenario about European colonization of Africa in the 1400s, a participant describes his design processes, out aloud, "before the European conquest of Africa the Bantu tribes were either pastoral or agricultural and usually pacific. What if I made Bantus numerous [by starting them out with a lot of cities] and give them high culture points? (as a way to model the influence of a less nomadic people on historical development)." He hypothesizes that a higher native African population that is less nomadic (with well established and inter-connected cities) and culturally widespread could have posed a greater challenge to Europeans in their conquests of Africa (and be interesting to play).

These examples suggest how game affordances and players' subjective interests interactively create a form of game play based around *historiographic choices.* In creating or modifying a scenario, players view historical facts as modifiable variables in the scenarios they create in order to instantiate specific historical simulation. Scenario editing entails knowledge about the right kinds of rules to modify in game and the kinds of variables to access in order to do so. Thus, in many ways, developing the skill to design historically relevant scenarios relies heavily on the ability to identify in-game factors such as, rates of cultural expansion, as well as a thorough understanding of how factors like say, economic interdependence and organized religion play in to civilization conquests. In doing so, the game demands specific forms of thinking about historical concepts facts; it recruits specific forms of thinking and hypothesizing about factual knowledge in history. Thus, in expert *Civ3* players, model-based understanding is manifest in their ability to understand the underlying architecture of the game system and model the key features in ways to instantiate the scenario as hypothesized.

Designing Learning Environments for Historiographic Gaming

These examples illuminate the nature of "productive" gaming, suggesting how expert "productive", mod-making practices, include appropriating the game to create a more accurate modeling tool, iteratively playing and designing game scenarios to create a customized, "ideal" version of *Civ3*, and using *Civ3* as a representational model for interrogating history, or for creating an idealized, customized form of *Civ3*. How might we design learning environments that give players access to such high-end, productive gaming practices; in other words, historiographic gaming?

To investigate this question, researchers have are iteratively researching and designing an after-school game-based learning program. Participants enter as novices, and through time learn to make their own game mods. The core learning activity involves playing a series of multi-player game scenarios played in 1-1 ½ hour time periods. Research methods were drawn from a design-based methodological framework, by deliberately and appropriately not controlling variables and using research methodologies to fit the morphing intervention, leading to considerable evolution

of the treatment over time (Dede, 2004). The design goal was to engineer effective learning conditions while theorizing the models that worked out to be successful in this setting (Bannan-Ritland, 2003). In other words, interventions were drawn from participant expertise in the game scenarios (such as introductory or advanced) and their involvement with the game (such as wanting to play a multi player or single player game). This approach to user-centered design seeks to develop "personas" of different users, including models of who the gamers are and what they want to accomplish, as opposed to one "standardized, homogeneous" model of the user (Cooper, 1999). Thus, the particular activities of various sessions were individualized to meet the group needs. This methodology can be broken down into four parts:

1) The specific games were designed to accommodate varying difficulty levels and play styles.
2) During and after gaming sessions, facilitators led briefings in response to observations made during play.
3) To drill down on specific phenomena, researchers conducted structured and semi-structured interviews.
4) Researchers designed driving events, events such as game competitions and modding challenges that were designed to (a) serve as instruments to capture snapshots of players progression on well specified tasks, (b) bolster enthusiasm for the program, and (c) enable players to see how they have progressed over time.

Players were encouraged to start out in pairs. During the game session, at least one facilitator played with the participants. The facilitator also created reflection activities for the end of each game to coalesce understandings.

All of the sessions were video recorded and entered into an online database of videos, imported into the software program Transana. Researchers met in weekly meetings to identify themes and plan future events. During analysis, composite cases of particular students were identified, themes were expanded, modified, and refined. Next, the database was interrogated for additional confirming or disconfirming evidence. Key passages elucidating particular themes were identified and transcribed. This paper organizes these findings around key themes which seek to elucidate the relationship between historiographic game play and learning, and to suggest features for how similar environments might be designed in the future.

Expertise in socially contextualized gaming

A notable feature of Civ camp, as a learning environment, was the variety of activities simultaneously occurring within it. Activities ranged from multiplayer games, to single player games, to "simultaneous" single player games (everyone playing the same single player game at the same time). Nevertheless, the activity revolved around playing (various versions of) Civ3, and as such, the shared space of the computer lab enabled the creation of a common discourse.

Making Knowledge Public. One typical practice was that individuals, after achieving a noteworthy accomplishment would announce their progress to the group. Each time a new discovery (such as writing), was made, players would herald this to the entire group. This practice achieved several functions. For some players, it redefined the "game" being played in terms of their own goals; players with a large number of "Great Wonders" could, for example, reframe the game from being about military conquest to being about constructing wonders. Other

times, it advertised one's technological (and hence military) superiority. From a learning perspective, a key effect of this practice was that (1) advertised to other players what forms of accomplishment were available (new players were exposed to new terminology, concepts, and strategies this way), and it propelled others to compete with their peers. For example, soon after Mike acquired map-making, he built a galley, and declared, "I made a boat". Another participant responded, "I've got to have the stuff the other guys have," and he proceeded to set about developing this capacity.

Other times, vocal narrations of game play became a part of the game play itself. In the same game, as Rome (played by Jason) is at war with Carthage (played by Levi, facilitator). Russia (played by Marvin) is recruiting allies to war against Rome-Jason, seeking to capitalize on the fact that this protracted war has weakened Rome-Jason, and left them vulnerable. Russia-Marvin begins recruiting the Phoenicians (played by Deontey) to attack Rome-Jason. Russia-Marvin writes (in the chat space, which is public), "*Romans* are in my territory…they don't have the *right of passage*. How about a *military alliance?* I think we should team up against Jason… Levi is strong and already up against Jason".

First, this example suggests how terminology such as *Romans, right of passage*, and *military alliance* were taken up by players as tools for communication. In this example, as in earlier studies (cf. Squire et al., 2005), such language naturally arose in players as they needed tools to communicate with. Second, this example illustrates how the multiplayer game became an object for public scrutiny, and how negotiating interpretations of events, and potential moves became a core component of game play. In this example, Marvin begins with an observation that Rome is in his territory and an interpretation that this is an aggressive, hostile act. He notes that Romans - Jason are at war, and that Rome-Jason's chief adversary, Levi is strong. This statement is designed to put political pressure on Rome-Jason, which in other games has resulted in the offender removing units from enemy territory, tithing to avoid a war, or a public re-interpretation of events. This kind of public analysis of the game model, and subsequent political negotiation around it was core to the game play, something not observed in single player games. Much of the game play became this sort of argumentation, with those who can expertly dissect the system gaining the most social capital. It is noteworthy that almost no direct instruction on how to play the game occurred in this camp, but rather, players learned the rules (and subsequent terminology) through constant strategizing and action within the game world. These sorts of negotiations and ways of playing the game form particular game discourses, or "ways of being in world" -- within the game community, suggesting the fundamentally social nature of gaming expertise (Steinkuehler, 2006).

Collaborative troubleshooting as exploration of game concepts. Multiplayer games functioned as joint problem-solving contexts. Similar to how learning occurs in massively multiplayer games (see Steinkuehler, 2006), learning through game play featured players collaborating to dissect and understand the game system. Interpretations of the game system flowed freely among participants. Social value was placed on public displays of knowledge (usually performed as a sort of political negotiation) rather than on pure "success".

In the following example, Jason, Sid, and Marvin discuss military units such as scouts, warriors and horsemen in exploring, again, as a part of a broader political negotiation:

> Sid : There is a Russian scout in my territory!
> Marvin: Scouts can't attack or take over cities…right? (looks for confirmation from Levi).

Sid opens the exchange with an observation that a Russian Scout is in his territory, which as illustrated above, is often interpreted within this community (as in many) as a pre-cursor to war. Marvin interjects, noting (in the form of a question) that scouts cannot take over cities. This question is designed to result in Levi, the expert, answering "no", which Marvin hopes will result in his move not being interpreted as aggressive.

> Sid: What's the point in bringing a scout if they can't attack? You can just take your warriors instead.
> Marvin: Scouts travel faster than warriors.
> Jason (Overhearing the conversation): Once you get your horsemen, send them of to explore…and pillage and stuff and then send swordsmen to follow them.

In this example, Sid (who is 8 years old and a novice buy comparison) "buys" the interpretation that the scout is only exploring, but then asks what the point of bringing scouts into enemy territory is, since they cannot attack (and warriors can). Marvin responds with a factual explanation (scouts move faster), although, notably, he does not share why strategically this is a desirable move. Sid will have to figure that out on his own (the primary reason scouts are desirable is that they enable the player to locate strategic resources such as horses or iron in advance and design a civilization so as to maximize access to these resources).

After this game session, as in most days, players recapitulated what happened. This practice enabled players to brag about their accomplishments while also collectively dissect the game system to better learn from actions. This kind of debriefing, which is considered key in the literature around gaming (cf. Thiagarajan, 1998), flowed naturally in this game space. Participants exhibited a natural desire to discuss their specific game moves and strategies the result of which were general heuristics that became "taken-as-shared" meanings within the community. This particular game was marked by very quick losses by several players due to excessive warring early in the game. Jason explains what he learned:

> Jason: No war till you have spearman defending your cities. I'd say build one warrior as soon as you build the city, because barbarians stole gold from my city.
> Becky: I declared peace with every Civ.
> Mitzi: (Who didn't like losing her cities): My strategy was building cities and attacking other people to get our cities back.

Thus, the learning process through play was deeply iterative. Similar to Peirce's "abductive" reasoning process, it followed a pattern of players developing and holding a model of the game system (such as build units and attack civilizations to obtain their resources), then suffering from expected losses and a quagmire of uncertainty about the model (and personal conflict) which led

players to refine their understanding of the model (Driscoll. J, 1994). Jason develops a relatively simple algorithm for maintaining a defense. Becky reports a different strategy altogether, which here is a proto-strategy (play peacefully), which in later games she developed into a mature strategy of rapid growth, exploration, and building, so that she had an infrastructure vastly superior to the other, more military-focused players. Mitzi's strategy was similar to Becky's albeit more defensive.

Creating a Playful, Lucid Mood. Conversations as a core gaming activity not only mediated problem solving, group and individual play, but also set up the general mood for the space - an interesting parallel between ==*third spaces*== in MMOs and in this sort of face-to-face gaming community (Steinkuehler, 2005; Steinkuehler & Williams, 2006). Steinkuehler (2005), in her portrayal of MMOs as third spaces describes old-timers as "regulars" who give MMOs its character by setting up the general mood for the space. Similarly, conversations in Civ camp transcend game-mechanics and produced a social context specific to Civ camp. The nature of this space, which might be described as a playfully competitive environment was one that researchers (as designers) frequently struggled to negotiate. On the one hand, the space had to be "the kids' own space" and reflect their needs and desires to game in particular ways, but at some times, this emergent ethic contradicted our own sensitivity and values. For example, the following excerpt between Monroe (an old-timer), Sid (old-timer) and Sadira (newcomer) illustrates the playful, but direct competitiveness, and even "hazing" that often emerged:

Monroe:	You're going to get killed as soon as I spot you.
Sadira:	(Seeking a facilitator's assistance): Ask Monroe to stop.
Monroe:	I am the champion.
Sid:	I want to kill Sadira too.
Facilitator:	Why would you do that?
Sid:	Because I like killing easy people. That's what everybody does when you're new.

As was often the case, the facilitator proceeded to form an alliance with Sadira in order to usher her into the game space in a safe way. Interactions such as these established the spirit of the environment and made it their own. Many displayed a desire to repetitively play and replay old games until they perfected particular strategies or approaches. This mastery occurred through a sort of self-initiated drill-and-practice routines, albeit augmented by the game's many forms of evaluative feedback.

In summary, participants partook in discourse practices prototypical to the social space of Civ camp, through (a) participation in conversations in game vocabulary (such as building military alliances, negotiating trade etc.), (b) displaying membership in a collective (competing to be in the "everyone" group by getting the same technologies and units that others have), and c) enculturation in the social practices of the shared space (e.g. setting up the general mood, bragging and "smack-talking" during the game).

From Newcomer to Expert Participation

Research on expert cognition details five stages that people go through in transitioning from novice to experts in which they develop qualitative differences in how they understand phenomena. A pervasive finding is that experts attend to *deep structures* in a problem, whereby

novices focus on *surface structures* (see Chi, et al., 1981). Within Civ camp, we see evidence for players' awareness of structure reflected in the kinds of questions they asked during game play.

Surface features- military overkill, discovering resources and dealing with civil disorders.
In early single player games, participants' questions focus on questions about the basic game rules, such as "Can barbarians take over my city?", relatively simple strategic questions reflecting a lack of goals in the game or awareness of how to accomplish them, such as, "I have a settler; what should I build next?", or questions stemming from a lack of comprehension of game events, such as *civil disorder*, which is triggered when the number of discontented citizens crosses a threshold (e.g. "My city is burning, how do I fix this?)." Typically, these questions would elicit a simple explanation from a more advanced player (often, but not always a facilitator). For example, Jason asks the facilitator, "What do spices give me?" to which the facilitator responds, "Spices are luxury that make your people happy. Basically, if you build road to it, you can get access to it. "

Another common early misunderstandings in defense was military overkill. In *Civ3* the early forms of governments can only support a limited number of military units, after which point players must pay 1 gold for every excess unit (which simulates the cost of maintaining a military). Marvin, unaware of the game's implicit model, stacks up dozens of warriors and spearmen and complains, "How come I'm getting no gold?". Much of the first dozen or so hours of play involves learning these basic features of the game model, and mastering the "basics."

Deep structures- building fewer, yet more manageable cities and strategic placement of cities to take advantage of resources, natural barriers
In later games, players displayed understanding of the game-model (*deep structure*) of the game through choices and decisions. This example occurs roughly a year into the program. Players are given a challenge: Pick 7 early technologies and place thee cities on the map.
Jason (playing as Celts) places his cities in close proximity to resources, with each city having access to either horses or iron. Jason had reverse engineered the scoring system in *Civ3* and focuses on accumulating points for the sake of a high score by planning faster expansion through large number of cities.

Conversely, in the multiplayer game challenge (based on the 100 years' war scenario), Monroe, playing as the English shares his frustration on too many settlers, "Argh! Settler, I'll disband him" when prompted by the facilitator to build one more city, he responds, "I'd rather have fewer stronger cities". As a matter of fact, Monroe had just spelled out an underlying game mechanic- large number of ineffective cities are too expensive maintain and more so during a period of unending war with the French, something that would be inconsequential in a short, single player game where the goal was to amass points quickly, but *would* matter in a longer multiplayer game, where players would need to build an economic infrastructure.

These examples demonstrate that Jason and Monroe are able to unpack the game architecture and also make decisions based upon *situational* references (victory points, in single player games, building an economic infrastructure in multi-player games). Both Jason and Monroe see the literal game features (like war, population growth, number of cities cities, or access to resources), while identifying the foundational principles of each game. Their strategies, are loaded with

solution schemes that they apply flexibly, as opposed to mere attempts to find specific unknowns or single solution answers (as was the case in earlier games).

Developing multiple <mark>*trajectories of expertise*</mark>

The preceding example elucidated expertise from a more traditionally cognitive perspective; we can also examine expertise from a socio-cultural learning perspective as participation in social practice. Three elements key to this model are a) social acceptance of new comers to the community of practice, b) progression of newcomers from peripheral or smaller roles, to more and more important roles in the community and (c) knowledge acquisition though participation, because knowledge is not a static commodity one receives, but a dynamic process of participation that one does (Lave & Wenger, 1990).

Unlike Lave and Wenger's account of participation, which emphasized relatively uniform notions of "central" practice, in Civ Camp (much like in the affinity groups described by Gee, 2005), there were multiple models of expert practice. In open-ended spaces like Civ camp that accommodate varying competencies, the notion of expert gaming is a relatively fluid concept, consisting of mutually overlapping forms of game play, such as game modding, expert military play, or play as historical inquiry.

At least two distinct trajectories of expertise development were evidenced among long-term in Civ camp participants:
1. Systemic, game-design approach to gaming (embodied by Jason)
2. Gaming as historical inquiry (embodied by Monroe)
These two forms of gaming were overlapping, and at times participants could engage in each, but fundamentally, they reflect two different orientations toward the game experience.

Systemic approaches to gaming. Over the course of one year in the program, Jason developed a design-orientation to *Civ*. For Jason, Civ3 was very much a game, a game with inputs (action), outputs (scores, or various victory states), and an underlying model that governed how they work. The first player in the group to learn Civ3's victory scoring system, Jason enthusiastically shared his understanding in the single-player challenge (also illustrated above), "My score goes up if I build more cities". Jason's interest was in exploring and manipulating the boundaries of the game system.

Jason constantly monitored his game statistics and self-evaluated his progress, comparing different in-game victory parameters, such as culture points, score, and power. In the multiplayer challenge game, playing as French, Jason takes pride for a high culture point, "…let me show you something, power wise, Sid is better than me, but I'm still doing so well on culture." At times, this sort of "reframing the game along different parameters" could be seen as simply a way of maintaining status in the community while "losing". However, as we shall see next, for some players (indeed many) the scores are more or less irrelevant, as compared to their own particular gaming goals -- winning in their own particular way.

Jason's approach to mentoring peers also reflected this orientation toward Civ3 as a game with more or less "optimal" ways to "game the system". For example, when the group started the

"Age of Discovery Scenario," which was designed to align with what they were studying in school, Jason oriented a newcomer as follows, "Pay attention to the Civs, like where they would start out on the map, because your cities can grow and expand faster." Reflecting after the game, Jason advises, "I'd say build a warrior as soon as you build a city." Jason shares a military strategy with another player, "Once you get your horsemen, send them of to explore…and pillage and stuff and then send [initiate attack with] swordsmen to follow them." Jason's strategic advice (which he gave frequently and freely) was oriented around specific strategies to "win", emphasizing strategies that optimally "gamed the system," a strategy that we have seen elsewhere (cf. Squire, 2004) and have called the "min-max" approach.

Historical inquiry in game play. Monroe's predisposition to history was manifest in his orientation to game play. As Monroe acquired systemic understanding about the game (also discussed under the development of systemic expertise), he began using the game as model guiding his historical inquiry. Playing Civ3 elicited Monroe's prior knowledge and piqued his interest in history. Monroe commonly related his game play to actual events in history, and frequently sought to play the scenarios as they were in history. For example, when discussing newly introduced concept- the "golden age" Monroe responds, "I know what a golden age is, your civilization becomes wealthier and you have great discoveries and build great wonders". Monroe describes golden age- the game concept that triggers increased production and trade as a historical metaphor often ascribed to periods of great endeavors in history when a Civilization is at its peek. He does not mention any particular game outputs (in fact wonders and discoveries are results of player actions). Unlike Jason, who frames advice and game discussion of units in terms of strategies, Monroe relates it back to historical concepts.

Similarly, when participating in the single player challenge (where Jason "min-maxed the system to gain points via building cities), Jason took a different approach, seeking to pursue technologies, build wonders, and build a robust civilization that could last until the middle ages. He explains, "I'm going to go for mathematics to get the Statue of Zeus (a wonder that can be built after discovering Mathematics). When a civilization offered to trade a city, he responded, "I don't want your city. I need technology. I'm almost to the Middle Ages!". Compared to Jason, Monroe is much more interested in using historical concepts, pursuing strategies that fulfill his goal of "replaying history", and exploring new ways to win through technological and economic development. At no point does Monroe mention points or "winning." For Monroe, the pleasure is more in the process of playing through scenarios.

Later in the camp, in an Age of Discovery scenario, a facilitator noted that Monroe was playing as the Portuguese. His ship was sailing around the North Americas, looking for a place to land. The facilitator asks him, "Why aren't there French settlements in North America?". Monroe's response blends game events and history, and his response is that, "The French were more interested in trading instead of settling. They mostly made agreements with the Indians instead of attacking them." For Monroe, this sort of historical fantasy was core to his game play. Monroe on occasion would bring his history book to camp to look up information as well.

Mod-Making. Unlike previous educational interventions with Civ3, which were designed around learning through playing scenarios, participants in the Civ Camp developed a level of expertise deep enough for them to begin transitioning into producers of game scenarios as well. When it

came to mod making, both Jason and Monroe used Civ3 as a history simulation tool, albeit with different emphases. For the scenario challenge competition, Jason constructed an ancient Rome scenario designed to "replay" ancient history, and examine under what conditions Rome may have not succeeded Greece as a dominant European empire. Jason comments, "In real-life Rome won Greece, but in the scenario I've made no one has any advantage over the other, Greece has a strong defense…the hoplites and Rome has Legions. I played as both to test." This scenario focuses primarily on relative military strengths, and seeks to rebalance game dynamics to make a more "equal" and fun game, as well as to explore this historical hypothetical.

After building this mod, Jason expressed interest in building a STAR WARS mod with the Civ3 toolkit. Without any encouragement from the researchers (and indeed unbeknownst to us until weeks into the project), he began keeping a notebook of design ideas, which he carried to school. This notebook contained approximately 20 pages of notes on unit types, methods for implementing features, and so on. When we learned of this endeavor, we sat down with Jason and showed him several similar total conversion mods, such as a Lord of the Rings mod. Jason explained to us that he wanted to be a game designer when he grew up.

Monroe, in contrast, modeled the current geopolitical conditions surrounding the U.S. - Iraq War (see figure 2). Monroe's goal was to see if the Civ editor could be used to model the modern world. Monroe spent a significant amount of time (both he and his sister estimated it at 30-40 hours) researching and referencing different sources for information, from encyclopedias to the Internet. This research included changing names and boundaries to reflect todays' conditions, as he used the editor to rename Civilization leaders to reflect current leader names. He created, moved, and renamed cities. Monroe used the permanent alliance feature to model the US and UK alliance against Iraq. Much of the work for Monroe involved reciprocally building maps, identifying features that needed to be included, and then sifting through the editors 1000s of settings to find the best way to model chosen phenomena.

By the end of this unit, Monroe had new interests with modding. Monroe struggled with how to model religion in Civ3 (something obviously important to contemporary political conflict, but not introduced to the Civ series until Civ4). At the end of the school year, Monroe's teacher requested him to list 10 things he wanted to learn the following year, and number one was how to use the Civ3 editor to model religious conflict in Civ3. Perhaps to the teacher's surprise, all 10 items related to learning with Civilization. Included in this list was a short proposal to learn American history through building a Revolutionary War mod. Monroe spent about 25 hours doing background research and playing with various maps to get this started, and he suggested that he could build it over the summer and then write a paper to accompany it.

----- Insert figure 2 about here ------

When comparing with expert modding practices, scenario editing is still at its nascent stages. Participants mostly focused on surface features (e.g. leader names, permanent alliances) and only began to adapt and change features, such as adding resources or manipulating core game variables. Both exhibit a readiness to transition to a deeper sort of modding practice. For Jason, the interest was fundamentally in game systems and game design. Monroe's interest was primarily in using the game as a tool for modeling contemporary and historical events. In both

examples, we see an interest in understanding how the language of the Civ3 editing toolkit might be used as a tool for expressing ideas. Future implications might be to take a closer look at cognitive effects of game-modding for developing model-based historical reasoning and developing curriculum that is specifically structured around game modding in *Civ3.*

Discussion: <mark>Historiographic Gaming</mark>

Multiplayer games hosted in shared space-functioned like *sandboxes,* which enable multiple forms of creative, expressive play. The learning process for these players was fundamentally *social*; knowledge about game rules, and literal game features is acquired as players are apprenticed into conversations around multiplayer games and discourses typical to Civ camp as a whole. Findings from the research indicate that through deliberate scaffolding and structured facilitation of activities over time, players develop systemic understandings about the game. Both games and the game environment were designed in particular ways to produce mastery. Learning occurred through what might be called "*semi-structured*" tasks (e.g. single player challenge), tasks that situated gradually developed their understandings of game mechanics, while also encouraging were not only able to situate in their understandings about the mechanisms of the game but also imbue skills that are indigenous to expert gaming practice, such as apprenticeship in discourses, situated understanding, and model-based understanding.

These examples argue for a new (admittedly nascent) genre of games for learning, which we have called historiographic gaming. This pedagogical approach is based on indigenous forms of gaming practices that have generated interesting forms of learning with games that embody key attributes of games (based on simulation, participatory in nature, and designed around aesthetics of experience). This program has sought to transition novices players into producers of game scenarios, with some success. The depth of learning required to truly become expert modders is substantial. Within this timeframe there is evidence that some participants were becoming expert gamers and novice modders -- with hints of movement toward more expert.

We observed two distinct <mark>trajectories of expertise</mark> emerging: One that developed around expert, systemic gaming (orienting toward the experience as a game system), and another that we call historical gaming, orienting to the game experience as a form of "replaying history". Both forms have value, emphasizing different aspects of the game system. We believe that a community tying these two forms of gaming together (and other ones, as they emerge) is key for building robust learning environments. Within this context, games functioned as places for joint collaboration, allowing these forms of play to come together. More explicit comparisons across game types could add to deeper learning, encouraging players to investigate various aspects of the system.

When it comes to reform or change in an existing system or practice it is not merely about making changes in the surface structures, but about questioning the ways people function (or expected to function) those structures are constructed. While schools have successfully identified the "categories" of learners (e.g. the problem solving kind, or the collaborating kind), these categories seem rather abstract and lack functionality. A rather profound effect of schooling seems to lie in acquiring these abstract categories. After-school game Civ camp, on the other

hand function as *embryonic communities* (Dewey, 1938) where realization of social motives and construction of meaning through actions enacted out specific ways makes up specific kinds of learners and gives them identities in and outside of the game. While schools tend to view new technologies as multiple elements and multiple literacies and that learning entails acquisition of all those skills, games are about *multiplicities* in world- not the "one" that is said in many ways, but rather the multiple that is "folded in many ways", in print, talk, image, gesture or art (Gee, 2003). In this sense, learning (or kinds of learning) are not unities or totalities, but multiplicities that are exemplified in the interplay of multiple identities. There are multiplicities in games and spaces designed around games, like Civ camps that operate in a system and eventually, raise the question about what value do we place on the things that our kids learn from technologies and to what extent our experiences from games can be intentionally leveraged as we create, use and adapt to new paradigms of learning.

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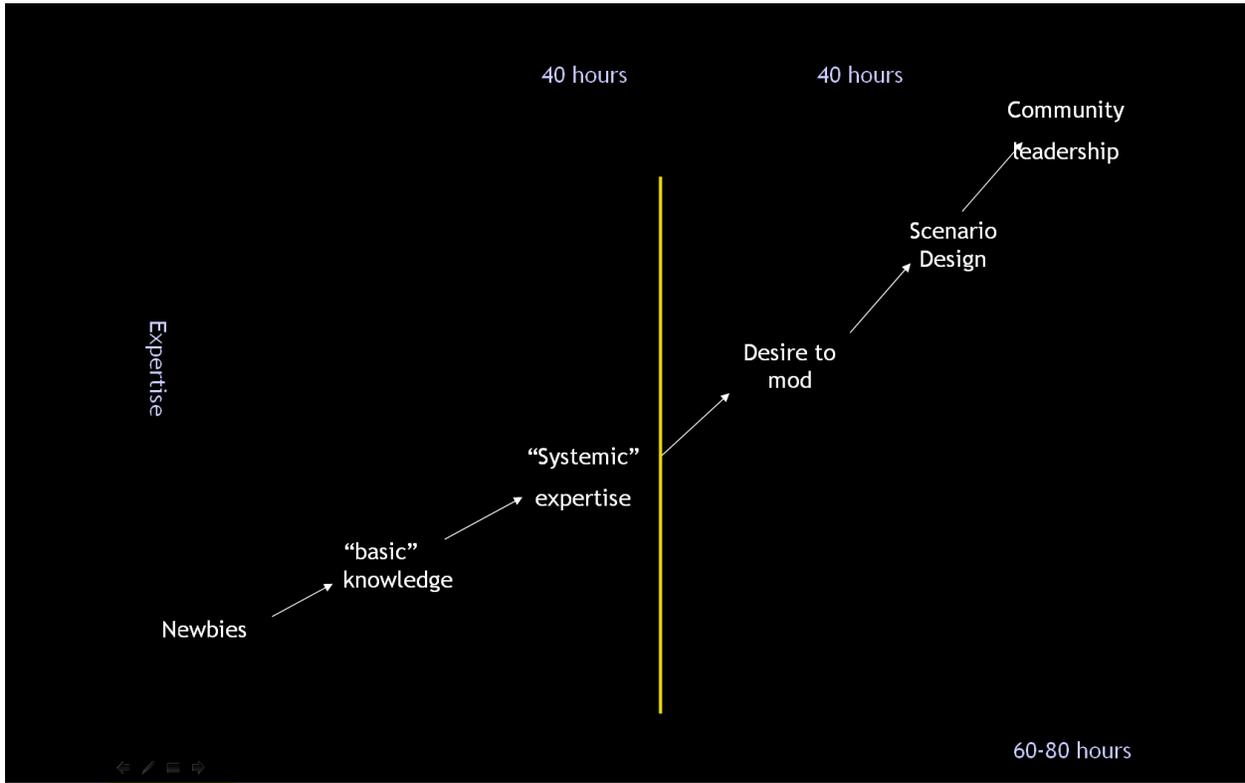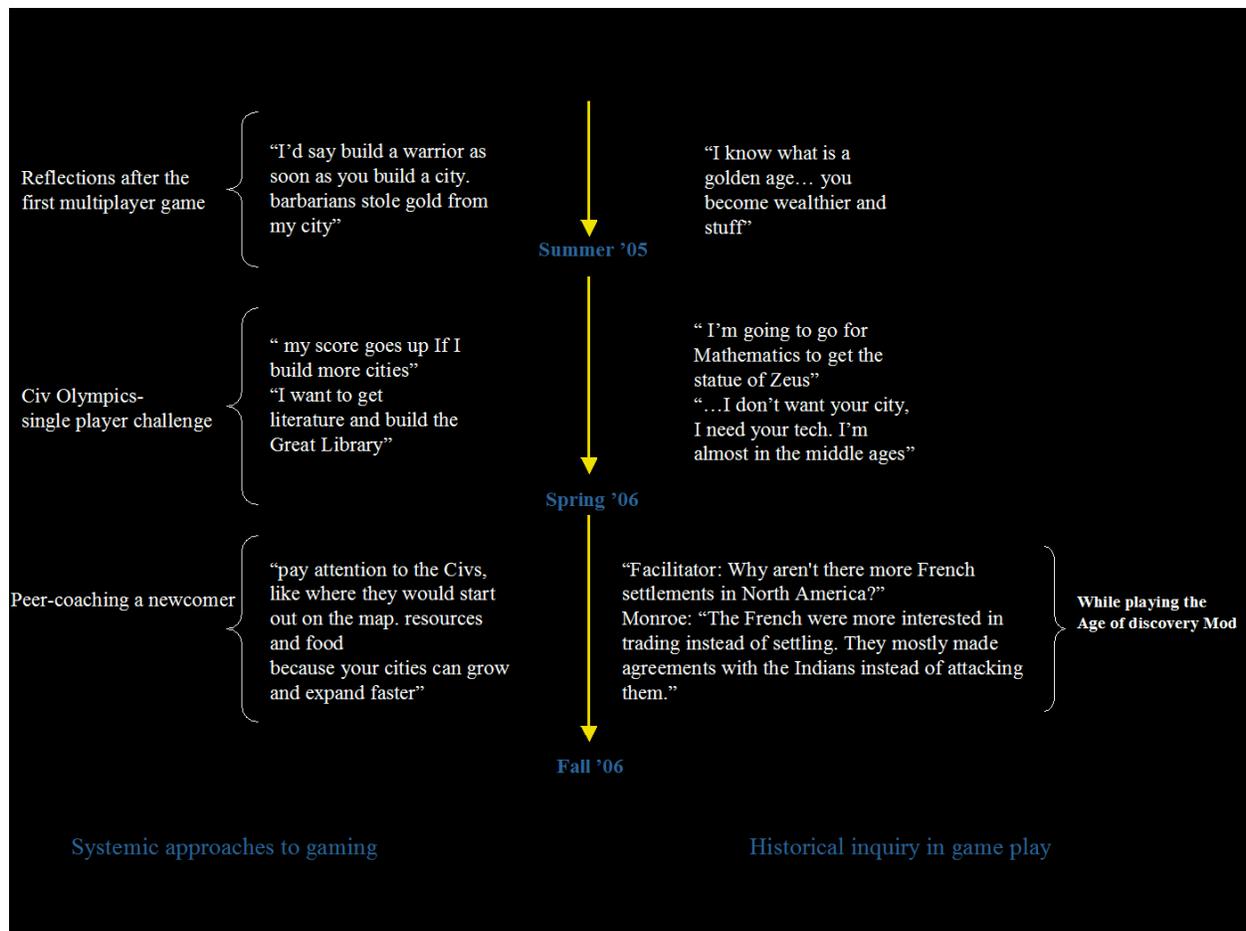
Figure 1: Trajectories of Expertise

Reflections after the first multiplayer game

"I'd say build a warrior as soon as you build a city. barbarians stole gold from my city"

"I know what is a golden age… you become wealthier and stuff"

Summer '05

Civ Olympics-single player challenge

" my score goes up If I build more cities"
"I want to get literature and build the Great Library"

" I'm going to go for Mathematics to get the statue of Zeus"
"…I don't want your city, I need your tech. I'm almost in the middle ages"

Spring '06

Peer-coaching a newcomer

"pay attention to the Civs, like where they would start out on the map. resources and food
because your cities can grow and expand faster"

"Facilitator: Why aren't there more French settlements in North America?"
Monroe: "The French were more interested in trading instead of settling. They mostly made agreements with the Indians instead of attacking them."

While playing the Age of discovery Mod

Fall '06

Systemic approaches to gaming

Historical inquiry in game play

Figure 2: Trajectiories of expertise development over the course of 2 years

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