

Designing Centers of Expertise for Academic Learning Through Video Games

Kurt D. Squire, Ben DeVane, and Shree Durga

Bio: Kurt D. Squire, Ben DeVane and Shree Durga teach and work at Curriculum & Instruction, University of Wisconsin-Madison and Academic ADL Colab, University of Wisconsin System

Correspondence should be directed to Kurt Squire at Email: kurt.squire@gmail.com, 544b TEB, 225 N. Mills St. Madison, WI 53706, Phone: (608) 263 4672.

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Abstract

Schools appear to be facing a crisis of engaging secondary students in meaningful learning. Many are recognizing that the learning principles in computer and video games make reflect our best theories of cognition, yet are underutilized as an educational resource. This paper suggests an alternative model for game-based learning outside of schools. Drawing on case studies of youth participating in a year-long program, it describes a n approach to bridging learners' identities in and out of school through historical simulation computer games situated within a community of practice of game experts. Participants developed both academic skills and productive identities as consumers and producers of information. through these cases, we propose a model of *centers of expertise*, learning programs that seek to foster and develop new media literacies with pay off in schools and that lead to new identities outside of school as well.

Simulation Games as World History Identity Resources

Most students dislike studying history and list it as their least favorite school subject (Hobbs & Moroz, 2003; Loewen, 1995). Marginalized and disenfranchised students frequently dismiss school-based history as irrelevant, oppressive or, in some cases, just wrong (Wertsch, 2000). In world history, the traditional dominant narratives of progress, western cultural domination and western intellectual (rational) superiority, are frequently regarded by marginalized students as propaganda (Dunn, 2000; Squire, 2004). While studying the use of *Civilization III* in classrooms, Squire (2004) found that many marginalized students questioned notions of western “progress” given their lived experiences as urban working poor. A challenge for educators is how to create situations where students can develop *productive* identities in the study of history by connecting academic history to their lived experiences and identities and then propelling them forward into new ones.

Situated Theories of Game-based Learning

Interactive networked simulations, or video games, are an emerging technological medium shaping contemporary theories of learning and instruction (Barab & Roth, 2006; Games, Learning, & Society, 2005; Gee, 2003; 2007; Squire, 2006; Steinkuehler, 2005). The increased graphical, communicative, and computational power of desktop computers creates new affordances for supporting learning. Already, any twelve-year-old student with fifty dollars can run a virtual zoo, lead a civilization, fly aircraft, or make millions of “real world” dollars by trading virtual currencies on real markets (Castronova, 2005; Squire, 2002; Steinkuehler, 2005; Taylor, 2006). Notably, educators are relatively behind both large corporations and the military in embracing games for learning (Prensky, 2001; Squire, 2006; in press).

Much of what players can learn through gaming is the properties of a simulated system. Rule structures make claims as to how the world works (i.e., In *Civilization*, river valleys produce twice as much food as hilly areas). Games immerse students in representations of the world and may provide interpretive frameworks for understanding history. Indeed, a competitive game imposes rules on players, as they must master the rules and understand their consequences to succeed. As such, simulations embody theories of history and, like any texts, contain *ideologies*, or theories of how the world works, that privilege certain perspectives and obscure others.

Games and their associated technologies are generating new social configurations. These forms of social organization operate according to a different underlying logic that reflects the decentralized, distributed, and informal nature of networked communities, whose features include 1) open-access (irrespective of location, education, or background), 2) “meritocracy” (valuing competence rather than accreditation), 3) distributed, joint projects where newcomers and old-timers collaborate on joint projects, and 4) flexible time tables (one can learn to program through modding¹, regardless of one’s previous experience), and 5) no “limits” on how far one can go. Participants can pursue any practice as far as they like, and many do. Not every organization will adopt these features, but the widespread existence of such spaces for learning may put pressure on institutional learning environments to adapt.

Civilization III as a “Possibility Space” for Learning World History

This project seeks to iteratively design and study an informal game-based learning environment for academic skills. It investigates how *Civilization III* can be used within a game-based learning community to provide access to more sophisticated academic practices, particularly basic “background” knowledge in world history, new vocabularies, deeper

¹ Making modifications to existing game content, such as color, textures, storylines, game modes, etc.

conceptual understandings, increased self-efficacy, and creative problem-solving with technology – 21st century skills (see Beck, McKeown, & Gromoll, 1989). In short, it examines whether an open-ended game (*Civilization III*) can engage children who are normally alienated from school in more advanced academic thinking.

Monotheism, monarchy, and metallurgy are not common topics for most 12-14 year olds, but they are for the millions who play the *Civilization* series. In *Civilization III*, players lead a civilization through six thousand years of history by utilizing natural resources and managing the civilization's economy, social structure, technological advancement, and diplomacy. The game contains 233 historical concepts, spanning from the invention of writing to democracy. Most importantly, *Civilization III* ties together complex and intersecting intellectual domains within one game: Players can explore the relationships between geography and politics, economics and history, or politics and economics – interdependencies difficult to discern through more conventional means.

Civilization III can be used as a dynamic visualization and hypothesis-testing tool where players speed up processes spread out over thousands of years, and the long-term consequences of decisions can be predicted and tested. *Civilization III* is also an interactive map in which players can explore the interactions of physical features (waterways, mountains, natural resources) with cultural factors (trade routes, colonization patterns, war and peace). This interplay is highlighted in the game so that physical boundaries emerge concomitant to cultural boundaries. Players experience the interaction of geography, culture, and politics at both the local and systemic levels. The relationship between natural resources, international trade, and local politics is made discernible so that players *experience* the need to balance domestic and military spending, invest capital to obtain natural resources, or create diplomatic alliances to

pressure a rogue state. Playing *Civilization* does not just lead to increased factual understandings, it gives players lived experiences to draw upon when learning academic content.

Designing Learning Systems for the Interactive Age

In the summer of 2005, we began designing a community of *Civilization III* gamers to investigate the game's potential to help disadvantaged² students develop fluency in world history and advanced problem-solving skills. We began work with twelve 5th and 6th graders who were mostly African-American and from lower socio-economic backgrounds. The following exchange typifies their orientation toward media at the beginning of the program:

Interviewer: Would you like to learn how to do game design?

Malcolm: No, it's too hard.

Monroe: No, that's not something I could do.

Most participants had little background with and low self-efficacy toward computational technology – none could navigate a Windows file structure. One participant took home a CD ROM to play at home and was surprised that his games were not saved when he returned.

Likewise, most participants had little interest in school:

Jason: I don't really like school, unless there's something fun going on, that's the only time there's actually something to do. You just sit there going [puts hand on head to imitate sleeping]. That's all you ever do really.

Interviewer: How do you feel about social studies?

Jason: Umm social studies can be fun depending on what you're doing. Last year we made a mountain out of graham crackers and we made it stuck together out of frosting and in the end we got to eat it.

² per the after-school center director, majority of the participants qualify for free lunch

For these participants school was largely something to be endured.

Creating an Academic / Gaming Culture

Over the next year we facilitated an after-school program designed to produce an expert gaming community of practice. This study examines data from this one-year period. Over the summer, participants met for sessions (2½ hours each for a total of 25 hours). During the school year, they met once per week for two hours, after school hours. Eighteen children attended the summer camp, with another twelve attending during the year (usually four to seven per day, see Table 2). This paper traces the trajectories of two core participants (Jason and Monroe) through the program. We periodically draw on data from other participants as well, but these two were the most central participants for a variety of reasons, ranging from an affinity for the game, to transportation issues others experienced getting to camp. Other students (a group of 3 boys, and later, two more girls) also participated nearly every week, but these data are omitted for space considerations and due to their variable attendance.

Names	Age	Summer?	Ethnicity / Nationality	Notes
1. Monroe	11	Yes	African-American (Cameroon)	Average achievement. Not disaffiliated
1. Sid	8	No	African-American (Cameroon)	Struggling reader
1. Jason	12	Yes	Caucasian	Low achieving, “classic ADHD”. Does not like school.

1. David	12	Yes	African - American / Caucasian	Low achieving, considers himself a “gamer”. In trouble at school
1. Malcolm	10	Yes	African - American / Caucasian	Low achieving, at risk

Participants played thematically-linked scenarios designed to teach the game while exploring historical concepts. Except for the first 2-3 introductory games, facilitators played with the participants in all the game sessions to model academic language and advanced gaming strategies, and to provide outside resources like maps as tools for game play. The first scenario, which begins in 4000 B.C. Players choose between several early civilizations that they will study in school (Egyptians, Phoenicians, Babylonians, Hittites). This scenario also introduces players to key game features like the patterns of food growth in distinct terrains and the necessity of trading technologies and resources so that their civilizations can thrive and produce military units. In following weeks, players were immersed in scenarios representing ancient Greece, Rome, and Mesoamerica. As such, they literally “play” weeks of their ancient history curriculum.

After two weeks, we introduced multiplayer games which transformed the lab into a more collaborative space. Players critiqued strategies and incorporated academic vocabulary into their discussions. For example, participants debated the impending military importance of iron resources and Roman legionnaires. Specialized language like *hoplite* and *war chariots* began to become a natural part of the vocabulary of the community. (Hoplites are an important ancient

Greek military unit). Adults playing alongside (and in teams with) the children also built cognitive apprenticeships as they shared and debated strategies.

Multiple game scenarios were designed to illustrate that no one historical model captures every aspect of history. In larger maps, the world's deserts constrained game play significantly; on smaller maps, river valleys could only support one or two cities (and as such cities were abstract concepts representing entire regions). Play changed according to the scale of each session's scenario thereby tacitly communicating that there was no "one" perfect depiction of history.

Shared understandings. Shared understandings included the importance of horses in ancient Egypt and the strategic importance of Greek hoplites in defending cities. Researchers administered "pop quizzes" to periodically assess participants' learning. Items included:

- Name 5 early military units.
- Describe the historical importance of hoplites.
- Name the 7 important ancient technologies and describe which one you believe was most important.
- Name five early civilizations and label them on a world map

Universally, players named military units and described their importance (Monroe described them as, "Hoplites are like spearmen, but there on the Greek civ (sic). They defend cities." Jason also gave the numerical definition of the units (1.3.1, in *Civilization* terms). That participants readily identified these units was not surprising, as early game play involves managing them and discussing them with peers (e.g., get your warriors out of my territory!). Knowing the difference between a hoplite and a horseman was critically important, and players' understandings reflected this. A challenge, however, was in constructing items that would gauge students' deeper

thinking. Perhaps socialized by school, no students were able or willing to write more than a few words in response to any assessment task.

Limitations in Understandings. Players were less adept at naming the civilizations and placing them on the map – they did so with about 50% accuracy. While this was an improvement over pre-tests (no one could place more than Egypt on a map), these examples suggest the interplay between situated game play and learning. Learning was tied to particular actions and goals so that it was not critical for them to definitively learn the location of other civilizations on the map. Learning (particularly as related to memory) was deeply *functional*. Players sought out, made sense of, and refined their understandings of ideas immediately germane to their goals.

Mentoring. Adult mentors modeled trade negotiation strategies through asking what technologies each had and what they needed to accomplish their goals. They also provided access to expert cognition by “reading aloud” from the game screens, examining the status of players’ games (where key resources and strategic military points were) and predicting how the game might play out. Mentors also opened trajectories of experiences for beginners. If a participant wanted access to horses, the mentor showed how extra resources could be added via the editor. When a player liked a scenario, mentors “lifted the hood” off the simulation and explained how it was designed. Mentors regularly showed players how to create new maps, change underlying game rules, and even how one might use the game editing tools to create a *Lord of the Rings* module.

Soon, participants became sophisticated game players. All could locate the major ancient civilizations on a map, name key historical military units, and make arguments about the growth of cities in particular geographic areas. Some advanced participants played online against peers and adults.

The program culminated in a multiplayer game in which the participants attempted to beat the adult mentors. One player explained how he hosted a sleepover party to study maps and plan an attack:

We (Korea and Japan) saw how close Greece was and figured that Australia had to be closer so we got out maps, I have this big map (at home), and we built a galley with settlers and were going to create a civilization and research to sail to Greece to make a secret attack on Levi.

The idea, while interesting, was ultimately ineffective. Afterwards, the group analyzed why it didn't work (ocean sailing requires advanced navigation technologies). This debriefing activity was common during and after multiplayer games. Immediately following important events, such as someone losing a city, players would jump out of their seats, run to one another's computers and construct narratives of what happened and why.

Developing Game Expertise

A subset of highly motivated participants (studied here) elected to stay with the program throughout the year (see figure 1 for a graph depicting their trajectory). These participants also played at home, sometimes using borrowed or donated computers. One participant obtained parts from a parent's friend and a graphics card from a researcher to assemble his own computer.

By the fall, players developed particular interests in history and gaming.

Interviewer: Who are you playing as today?

Jason: Scandinavia like always...Because I get berserkers ... I put them on the galleys and any cities close to the shore, I can just go off and use them to attack whoever is in the city...

These affinities resulted from an interaction between favorite strategies and interests in specific historical phenomena.

For example, Sid, an eight year-old, played as Rome and enjoyed building "wonders of the world":

Interviewer: How do you like to win, Sid?

Sammy: Building wonders. Like the Colossus, the Statue of Zeus, Temple of Artemis, Hanging Gardens, Pyramids.

Sid often played as Rome, which mean that he was centrally located in the Mediterranean and had early access to significant resources like iron. The strength of Rome's legionaries meant that few civilizations wanted to attack, so his strategy emerged as a function of the game's properties, his interests in history, and his in-game skills.

. *Game play as a leading activity for academic practices.* Throughout the year, participants began to commonly engage in outside learning activities like reading books and watching historical documentaries. This phenomenon is illustrated by Jason's investigation of the Vikings:

Interviewer: So do you think that this (attacking cities with berserkers) is like the real Vikings?

Jason: Actually it is because the berserks would take this stuff which they made called wolf-bane.... like with Ivan the Boneless, which is my name in the game.

Interviewer: Where did you learn this?

Jason: It's from a book I'm reading. It's a fantasy, but all the land and stuff is just like real Europe. They have Iceland on the map, and the long ships.

Interviewer: So have you read about this at school at all?

Jason: No.

Jason, like all participants checked out at least one book from the library and brought books on his favorite civilizations to camp. Jason projected this interest to his game experiences as he began naming himself Ivan the Boneless, thereby assuming an identity not available in school.

Each participant displayed dramatic increases in school performance, as evidenced by an increase in grades for these participants. Each of the three students participating in the program throughout the entire year received an A in social studies that year, having received mostly Bs and Cs the previous year. We were not able to obtain grades for the other participants and cannot make claims about their school achievement. In surveys, each participant (12 respondents) reported disliking school and strongly disliking social studies. However, they responded that they enjoyed playing *Civilization* and believed that it would help them in school. Every student also believed that “*Civilization* taught me new words and about geography” and “would recommend *Civilization* to a friend” on survey items.

Systemic expertise. Once players learned about particular units and identified successful play practices, they developed a *systemic* expertise about the game's interlocking rule sets. This expertise manifested itself through a variety of game practices. For example, when Malcolm lost a multiplayer game due to a protracted military campaign that drained his economy (his favored form of play), he started a new game and joined an Internet game with a fictional map. To his surprise, Malcolm was randomly assigned a starting location on a remote, large, and fertile

island. Immediately, he stopped making military units and built settlers, workers, and improvements for his cities. He excitedly explained to researchers: “I’m safe because no one can attack me until they invent ‘Map Making’.” He then focused on preparing his civilization’s infrastructure for the Middle Ages.

Malcolm’s actions reflect a systemic expertise because they suggest that the change of one or two variables in one game system (geography) led to changes in his thinking and strategy across multiple other systems of the game (economics, military, politics). Even though Malcolm had never encountered this scenario, he abandoned his usual strategy and invented a new one that was better suited to this situation. He knew which research-intensive technologies were required for ocean travel (Map Making) and, moreover, he understood that ancient military units were a useless drain on his economy in this context. This example suggests that games researchers seeking to understand players’ expertise may (when possible) change a few basic conditions in one aspect of the game system to see how players alter their strategies.

Developing Game Fluency

Many students began experimenting with the game editor by using it to modify and create their own custom games. Jason, for instance, used it to explore his interest in Scandanavian history.

Interviewer: So what is the scenario you made?

Jason: Well, I am Scandanavia and I have the island that I really wanted or that I had to get to if I wanted to win the game because it has every resource. Every island has horses and iron and the basic stuff...

Jason, like most students, was initially attracted to the editing tool because it allowed him to experiment with the game system. In this example, he gave his civilization resources that it historically did not have. He learned to use the editor primarily on his own, although he looked up researchers' phone numbers and called them at home with questions. We queried Jason on the historical accuracy of this hypothetical scenario:

Interviewer: So what do you think about that historically? Were the Vikings sort of isolated, were they on an island?

Jason: Well, Vikings were up in the Netherlands, but then they also controlled Iceland and the northern tip of the United Kingdom. They were kind of isolated, and if you saw them in battle or if they came to your town you were very unlucky because—well you were kind of lucky and kind of unlucky because they don't really attack a lot. If they are sailing, they were going to different islands, and if there are no people there, they will leave guys there to start building up cities. Then they'll just have more people come to the city. They'll just keep on taking over the land. If there is a village in their way, they will destroy the village.

This passage suggests that Jason has developed a *fluency* with terms and events in Scandinavian history. This background knowledge is important for academic success as history texts in classrooms frequently, and falsely, assume students have this basic background knowledge (Beck, McKeown & Grommol, 1989). However, Jason is also learning geography and historical terminology far beyond what is expected in school by building micro-narratives of historical events. These behaviors and dispositions stood in contrast to his attitude at the beginning of the

camp, when he was uninterested in game design and largely disaffiliated from school. By the end of the camp, he checked out history books from the library and designed game scenarios to play.

By the spring of 2006, participants regularly created their own game scenarios for the program. They experimented with different starting points for civilizations, rates of game play, and resource allocations. For these students, the desire to modify games was not a distant and abstract goal, but rather a natural outgrowth of their desire to entertain friends, express themselves, and achieve status in their community.

Emerging Forms of Expertise

Two participants embodied two distinct trajectories of expertise that emerged: (1) Jason had a systemic, design-based approach to gaming, while (2) Monroe focused on historical inquiry (although each engaged in other forms of play at times, as exemplified by Jason's fascination with the Vikings).

Systemic game-design approach to play. Jason oriented to *Civilization* primarily as a simulated game system. During our "single-player game challenge" for example (an event where players competed for the highest score), Jason discovered patterns in the game's scoring algorithm such as the correlation between a high numbers of cities and a high score. He developed strategies such as building the Great Library – a "world wonder" that allowed him to obtain technologies from the computer-controlled civilizations. He employed these strategies as opportune methods to "game" the system, exploiting leverage sports in the scoring model. Jason also actively self-monitored his play, frequently evaluating in-game statistics scoring his culture, technological progress, and diplomatic influence.

Historical inquiry in game play. Monroe developed an intense interest in history that soon manifested itself through his game play. For example, Monroe encountered the term

“golden age” and soon connected it to periods of economic and cultural prosperity for civilizations. While participants were playing a scenario roughly modeled on the European colonization of North America, the facilitators asked the group “Why aren’t there French settlements in North America?” Monroe immediately answered, “The French were more interested in trading instead of settling. They mostly made agreements with the Indians instead of attacking them.”

Going back and forth between games and history was a primary motivation for Monroe and he developed a particularly interesting style of game play. He would bring his social studies book and literally “replay” history by re-enacting events, like Columbus sailing to America, in-game. In one game set in the 15th century, another participant playing as Spain wanted Monroe, who was playing as Portugal, to engage in a war with England. However, Monroe claimed that he could not, as it would not be historically accurate. (Monroe did not, however, have a problem with colonizing the entire Eastern shore of North America). Monroe often asked researchers to distinguish which parts of scenarios were historically factual and which parts of the game were fictionalized. For Monroe, a pleasure of game play was inserting himself into history and then exploring the choices available from a given civilizations’ perspective. In other studies, we found similar “re-enactment” play patterns among players in an online *Civilization* fan community and in schools (cf Squire & Giovanetto, in press; Squire, 2004).

From Consumers to Producers of Information.

Six months into the program, we held a “modding” competition to encourage participants to create custom modifications. Four of the five players who regularly attended at that time created mods; only Sid (who was eight) did not. Jason and Monroe developed the strongest interest in modding, and used the scenario editing tools for historical simulation. Jason created a

scenario based on ancient Rome, while Monroe made a scenario depicting the Iraq war. Jason's scenario was a hypothetical history designed to "even out the playing field" between ancient Greece and Rome. He described his scenario: "In real-life Rome beat 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 [for its offense]. I played as both to test." Here, we see Jason engaging in a curious form of inquiry -- modifying the game parameters to "test out" the relative importance of hoplites and legionaries. Jason thought primarily in "game terms" and how particular variables affected history.

Monroe used the modding tool to model the US / Iraq war by changing the civilizations and their leaders to reflect current geopolitical conditions. He spent a significant amount of time researching and referencing different sources for information to build a very detailed geopolitical model. On one occasion, he asked the facilitators who the president of Mongolia was and what his or her orientation to the war was, but the facilitators didn't know much about Mongolia's current political situation. Monroe tried to research his scenario using encyclopedias, but quickly found that most books he could access were woefully out of date and that Wikipedia was more accurate and efficient.

A key limitation of *Civilization* as a simulation tool is that it only supports sixteen civilizations, meaning that simply mapping current major sovereign countries onto the map is unfeasible. Confronting this challenge, Monroe treated civilizations as factions as they pertain to the Iraq war. He created sixteen major civilizations, including the United States, the United Kingdom, Spain, Portugal, France, Germany, Russia, Mongolia, India, China, Egypt, Iraq, Brazil, and Australia. Resolution limitations also affected his decisions; there was no map that could both show the entire globe (important to model the U.S.), while also providing enough

detail to model forces operating in the Middle East. Monroe invested about 20 hours outside of the sessions building his model, which included significant time invested in learning the editor. Given the complexity of the modding interface, it was somewhat remarkable that the participants made any real headway with the tool.

Developing School-Affiliating Identities

By the end of the year, each participant showed distinct transformations, taking on new roles in the community and developing new identities. Every long-term participant earned “A”s in social studies for the year, and their parents reported that their grades had gone up across all subjects. On the last day of school, we found a worksheet in Monroe’s folder, outlining “10 things that I’d like to learn next year.” All ten items related strongly to *Civilization III*, as the list included goals like, “Could I model the American Revolution?” and “How is religion modelled in *Civilization*?”

Over the summer, Monroe began building a scenario to model the American Revolution. He invested roughly 30 hours on it working at home. Similarly, Jason asked his teacher if he could use *Civilization* the following year in class. As of this writing, he and Monroe began working on a website for their teachers to use *Civilization* in classes: <http://civworld.gameslearningsociety.org/>.

In the following conversation, Monroe meditates on these changes. Monroe discusses how playing the game has changed his life, opening new identity trajectories for him.

Monroe: This whole game has changed my life. Yep.

Facilitator: This Rome scenario or Civ?

Monroe: I mean like the game, ever since I played it.

Facilitator: How has it changed your life?

Monroe: Well like, most of the other videos games are boring, but this isn't.

Facilitator: And this one isn't?

Monroe: Yeah, and my family plays it.

Sid (brother): No they don't.

Monroe: Mom and dad want to, my mom does.

(later that day)

Monroe: I want to become a Senator some day

Facilitator: Is that from playing this game?

Monroe: Pretty much.

Of course, we do not make the causal claim that playing *Civilization* will make a child want to become a Senator. However, this kind of identity transformation is the result of a comprehensive program designed to leverage participants' interest in gaming toward other ends.

Discussion

The proliferation of grant programs, conferences, and books about games and learning reflects an intensification of interest in new media for learning. Although there are no real “killer applications” for game-based learning yet, we contend that *Civilization III*, when modified, is a potentially powerful tool for learning. Open-ended games like *Civilization III* are in fact already compelling, but largely untapped resources, for educators. *Civilization III*, which is now six years old, enables its players to inhabit complex systems and take on new school-affiliating identities, so that they develop complex academic understandings as a result. This study demonstrates the ability of gaming cultures to make new identities available to learners.

Leading Activities for Expertise

Gaming may be most effective as a *leading activity* for academic practices. Playing *Civilization* increased participants' interest in social studies and in turn steered them into more academically valued practices such as reading books or watching documentaries. Players developed an affiliation for history that fueled their game play, so that some participants like Jason or Monroe became *expert* players in one or more domains.

Crucially, this expertise was an amalgam of game play and history. Participants became experts in particular strategies or approaches. Jason quickly emerged as the master “game player,” as he was most interested in the game as a system. Monroe, who had the strongest school-affiliation of the group, developed his unique style of historical game play. Likewise, Sid, a younger and relative late-comer to the program became the master “builder” by building improvements and “wonders” in his cities. This was a sophisticated form of play that involved maintaining sufficient military strength to avoid being conquered yet maintaining significant resources to build great wonders.

If games involve a literacy of expertise (Squire, in press), the most valuable educational benefit of sandbox-game environments (games and associated social structures) may be that they aid greatly in developing, motivating, and sustaining multiple, overlapping forms of expertise within a common domain. Players cultivated specialized interest areas in which they were recognized as experts by their peers. This arrangement contrasts with a school-based approach, where students learn prescribed knowledge from the teacher at uniform rates. However, the expectation in sandbox-game environments is that each participant *should* develop unique expertise. If participants stop learning and being challenged, the game gets boring and the community dies (cf. Koster, 2004). The fact that learning, knowing, and being an expert are deeply pleasurable and motivating experiences for these players, yet that they all considered

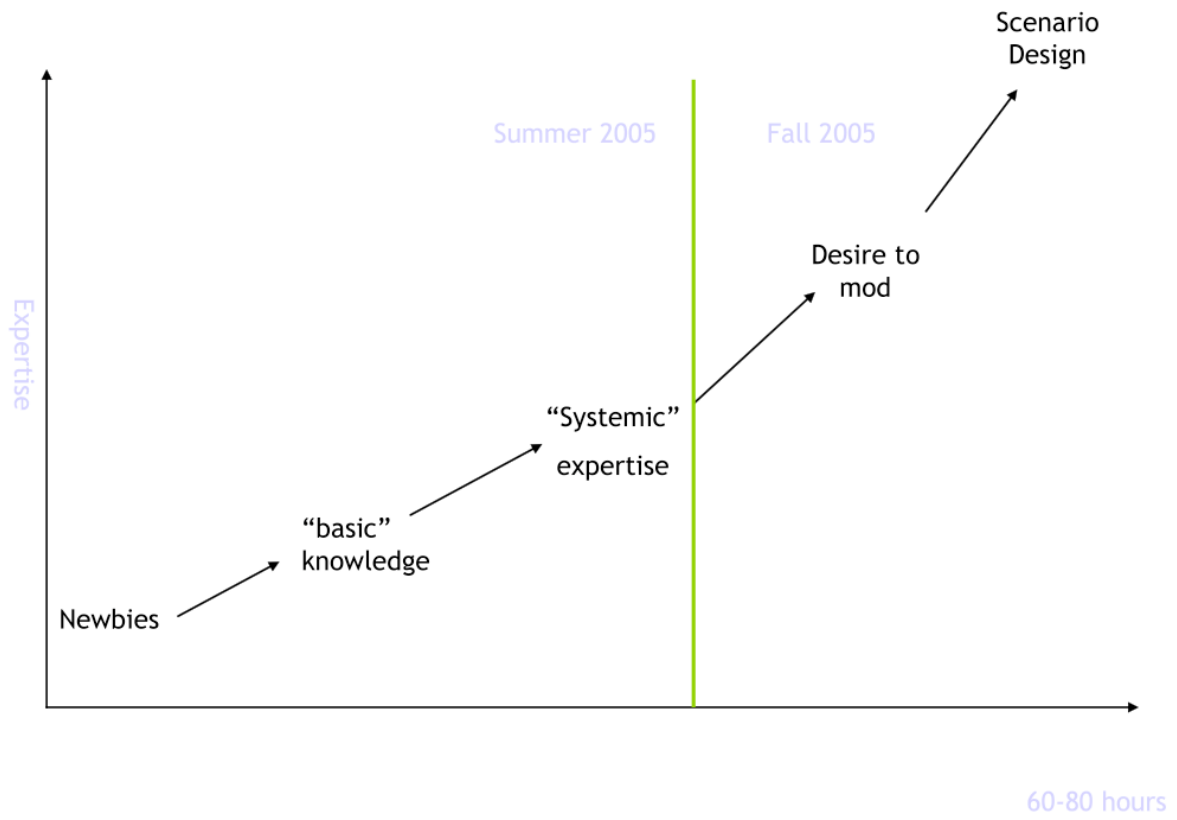
school “boring,” seems deeply ironic. In comparison, schools, which are organized according to a logic of uniformity and control, provide surprisingly *few* opportunities for similar expertise to emerge, and unfortunately, appear to be moving in the opposite direction at a time when deep systemic knowledge and expertise seem much more valuable than superficial factual knowledge.

Centers of Expertise

We use the phrase *centers of expertise* to characterize how learning occurs through participation in Civilization camp. This model attempts to extend Crowley and Jacob’s (2002) notion of islands of expertise by acknowledging that expertise is created, supported, enacted, and distributed across socially situated practices. We argue that mapping players’ identity trajectories by allowing them to develop expertise within communities is a profitable way to frame learning through gaming.

From an educational standpoint, the best merit of such spaces may be their natural propensity to bridge home and school. *Civilization III* contains vocabulary, concepts, and ways of thinking about world history with academic value. At the same time, game play naturally “goes home” with participants, with some going as far as building computers to gain access to the game. As such, the *Civilization* camp functioned as a bridging space for participants, creating a recreational gaming space that connected their out-of-school and in-school lives – a crucial, but difficult achievement for underserved and underprivileged youth. As the games industry expands and medium matures, there are any number of games that teachers, parents, or other educators might use to support learning. In history, *Europa Universalis*, *the Patrician*, *Sid Meier’s Pirates*, *Railroad Tycoon*, *Colonization*, and the *Rome: Total War* series all have potential (and indeed many have been used by teachers) to support learning (Egenfeldt-Nielsen, 2005; McCall, n.d.; Squire, 2005). In business / management / early mathematics, many of the *Tycoon* games have

been used as well. In short time, a number of games designed specifically for learning will emerge as well. We argue that the chief barriers for schools will be whether they can support the underlying models of learning that include students developing and following unique learning interests, developing differential levels of expertise, and having significant autonomy in pursuing their learning interests.



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Annotated Bibliography

Civworld <http://Civworld.gameslearningsociety.org/> Civworld is a site for educators interested in using the *Civilization* series for learning. It features custom game downloads, case studies, and resources for educators interested in using the game. It also includes online forums for educators to discuss uses of the game.

Historical Simulations in the Classroom (<http://sims.countryday.net/~mccallj/index.htm>) is a website maintained by Dr. Jeremiah McCall, a secondary social studies teacher at the Country Day School in Cincinnati. Dr. McCall's PhD is in ancient History, and he has a variety of innovative ways of using historical simulations in the curriculum. His model of "games as historical interpretations" is an excellent way of thinking about the medium. This is a great site for both ways of thinking about games in the curriculum, and very practical ideas based on it.

Joystick101.org. Joystick101.org is a website dedicated to the "serious" study of games. Its goal is to foster a community of thoughtful gamers with a professional interest in the medium and industry. It features news, features, and analyses of games and is a good way for those less familiar with the medium to become current.