STUDENT, GAMER, SCIENTIST:

IDENTITIES AT PLAY LEARNING ECOLOGY WITH THE NGAME

by

Julia E. Collins

A thesis submitted in partial fulfillment of
the requirements for the degree of

Master of Science
(Agroecology)

at the

UNIVERSITY OF WISCONSIN-MADISON
2013

Acknowledgements

First and foremost, to my parents who have always cheered me on and never once put limits on my dreams – thank you for helping me to look at the world through my own wacky glasses. You gave me the courage to pursue what was meaningful, not just sensible. Even things with names like Agroecology and narrative inquiry. Finding qualitative research was like coming home for me - I guess Mrs. Orsini lost this round.

To all of my friends, you guys rock. From your support in person and via Skype sessions to hugs to all the "likes" you gave my stressed-out posts on Facebook; from commiseration to encouragement, and celebration; from letting me take over whole rooms of shared apartments to sharing drinks and popcorn; from kindergarten buddies to friends from this summer, you all have kept me going. I said it would be a miracle if this darn thing every got finished, and it's all down to you that it finally did.

And of course, a great big thanks to my committee, who brought their various perspectives to bear on this eclectic project. Teri, I never would have embarked on this adventure if you hadn't been so open-minded, supportive, and excited about new approaches to education. Mary Louise, you've shown me just how compassionate teaching and research can be, and for that example, I will be forever grateful. And Randy, your eagerness to try new pedagogical strategies was as energizing as your advice was steadying. Tim, committee member emeritus, you're the most provocative thinker I've met and your ideas, teachings, and abundant cursing have shaped my life for the better. Thank you all for helping this come to life.

And to Cindee and Jean, mentors throughout my work as a TA, you've been life coaches whether you realized it or not. Thanks for not only keeping me employed, but reminding me to stay human throughout the often disorienting process of graduate school.

Gratitude doesn't even begin to cover it.

For Grandma Sue

This paper grew like the flowers you so loved. You will be missed.

Table of Contents

Introductions

As an ardent reader of Jane Austen, I see great magic in introductions. In her novels, the formal introduction of one character to another opens a new realm of conversation: intimacies can develop, curiosities can be pursued, and true insights can be won. An introduction is an invitation to engage with someone previously unknown and inaccessible. While the custom seems quaint in an era where two complete strangers can meet as fantastic avatars in elaborate online arenas, the concept resonates for me with the work of research. Any new paper is an invitation to its readers, an offer to begin a meaningful relationship: come and speak with these ideas. Listen for the news they offer. Consider what you, too, have to say.

This thesis will be full of introductions. Most importantly, the reader will meet six young students and listen to their accounts of gameplay in college science classrooms. Before this meeting can take place, however, another introduction must be accomplished between an approach to inquiry and the field that it addresses: narrative must be brought to bear on the world of games and learning.

To begin this process, I will take a discursive approach to establishing my research question. First, I will describe the educational challenge that forms the basis of my study: how to effectively teach the nitrogen cycle specifically and complex scientific material generally. From there, I will survey the literature that proposes games as a strong candidate for achieving this educational goal. From this survey I will derive my research focus on identity, highlighting the insights it stands to offer our existing understanding of game-based learning. To create a platform for a discussion of identity

and games, I provide a review of prominent perspectives on the interaction between games and identity. This review ultimately problematizes the assumption that games are inherently motivating sites of learning in classrooms because. Specifically, the identities that game and classroom contexts evoke from students are often at odds. As my data analysis will draw on commonly held ideas about gamer and student identities, I next develop the ways in which these identities are understood in the games and learning literature. I conclude by returning to the general question of why games can be good for education, exploring the concepts of epistemic frames and avatars. These ideas will pave the way for my particular approach to issues of identity in game-based learning. This final discussion will furnish us with the basic logic behind my research question, enabling me to introduce the conceptual framework and methodology with which I addressed this question. Here, I will provide an overview of narrative as a research methodology, explaining the benefits of this perspective for inquiries into game-based learning.

In covering topics from the two imposing literatures of game-based learning and narrative inquiry, I have attempted to be as in-depth as possible in order to provide an appropriate introduction to readers who may be unfamiliar with either field (or both). I erred on the side of more detail to illustrate the rich context in which my question and others like it are embedded. Additionally, since this study foregrounds identity and the stories students tell to create it, I wish to open a space for personality to flourish amidst the citations – specifically the personalities of my participants, but also my own and those of the vivid authors whose work informs my thinking. I believe that every piece of

writing is a sort of storytelling and as such a sort of self-making. This thesis is no exception. I could easily write a whole other document about what this work has given me and the role it has played in my own journey through graduate school. These are tales for another day, however. For now, it is time to introduce the educational challenge that prompted this study.

The Nitrogen Cycle

The nitrogen cycle is a fundamental concept in almost any scientific discipline you can name. While many students encounter the subject in its basic form during elementary or high school, the nitrogen cycle becomes especially important in college courses. A mainstay of ecology curricula, this biogeochemical cycle also figures prominently in microbiology (microbes are responsible for the chemical transformations driving the cycle), organismal and plant physiology (nitrogen is a crucial building block of proteins and other molecules vital to life on earth), public health (certain nitrogenous chemicals are prominent air and water pollutants), and agriculture (nitrogen is an essential element plants acquire from the soil; without it, crop production fails). Given the wide reach of this topic, it is imperative that scientific educators communicate it effectively to their students. Unfortunately, this is easier said than done.

Teaching the nitrogen cycle is a strenuous challenge at the best of times. Even eager students find the topic confusing and difficult to master. As such, nitrogen is frequently relegated to the academic graveyard of "boring" subjects (Balser 2011). Clearly, conventional modes of instruction are inadequate to the challenge of conveying

both the content and import of this critical scientific information. If we want students to appreciate the nitrogen cycle in the way that scientists do, science educators must seek out new instructional tools. From this realization, the NGame was born. A hybrid board/card game based loosely off of Shoots and Ladders and Magic, The Gathering, the NGame provides students with the opportunity to play through the nitrogen cycle instead of listening to it being described in lecture or reading about it in a book. The designers of the NGame were of course not the first to suggest that a game might be a better vehicle for learning than textbooks and powerpoints. In the next section, I will review the current thinking about games for learning (or "serious" games as they are sometimes called).

Games for Learning

Why are educators interested in games? This question grounds the story in countless opening paragraphs of the games-and-learning literature today. The usual plot runs something like this:

> Edutainment and instructional computer games were once [upon a time] touted as the savior of education because of their ability to simultaneously entertain and educate (Charsky 2010).

> Over the past few years, games have gone from social pariahs to the darlings of the media, technology, and now educational industries (Squire 2005).

> There has been a major shift in the field of learning from a traditional, didactic model of instruction to a learner-centered model that emphasizes a more active learner role. … The "Holy Grail" for training professionals is to harness the motivational properties of computer games to enhance learning and accomplish instructional objectives (Garris et al. 2002).

We have to invent radically new ways of learning (Pivec et al 2003).

Clearly, "The End" is far from sight. From social pariah to radically new Holy Grail, the ascendant "game based learning paradigm" (Squire 2008) constitutes a dramatic shift in how we think about education. And yet, most serious games are not used in curricula designed under such a paradigm. Rather, they are being deployed experimentally, though energetically, in classrooms structured around more traditional models of education (Squire 2005). Working with the NGame, I have personally been impressed by how enthusiastic instructors are to incorporate games into pre-existing courses. The literature on game-based learning certainly supports this eagerness: there is growing consensus regarding the promise of serious as well as conventional games as teaching tools and sites of learning (Gee 2007; Prensky 2001; Shaffer 2005; Squire 2003).

For many, game-based learning (GBL) offers an engaging atmosphere where information has contextualized meaning, students control the pace of learning, and audio, visual and kinesthetic learners alike find stimulation; as such, GBL promises to enhance both student motivation and academic performance (Gee 2007; Ketelhut 2007; Mayo 2009; Sulzman 2004). Given these possibilities, GBL is of particular interest to educators in the STEM disciplines, where prevailing educational practices contribute to high attrition rates and a perception of science as inherently dull and difficult (Seymour and Hewitt 2000). Engineers and technological professionals have embraced game-based instruction and simulation exercises (Shaffer 2005), while many of the games featured in GBL literature are designed to teach math concepts (Prensky 2001). Science educators also feel the need for innovative teaching strategies: despite persistent calls

to improve our nations' scientific literacy (Feinstein 2010; Frick et al. 1991; Geoffry and Durant 1987; NRC 1988), many studies still show that students from early elementary through undergraduate, as well as adults in the workforce, persist in ignorance of key scientific and environmental principles (Pense and Leising 2004).

Barab et al. (2010) contend that science education is uniquely poised to benefit from GBL activities. Traditional methods of teaching sometimes fail to convey the deeply social nature of science as it is professionally practiced. Embedded in cultural debates and requiring difficult ethical considerations, science is not nearly as simple as lecture PowerPoints sometimes suggest. Game environments in which players can take on prospective professional roles or manipulate models of complex natural systems seem ideal for helping students to engage with these difficult concepts (Barab et al. 2009; Squire 2006). Adding to their science education appeal, games require rapid, small-scale iterations of the scientific process as students continually hypothesize, experiment, and assess actions within the game; Mayo (2009) notes that this action corresponds to the highest tier on Bloom's Taxonomy, "Evaluation" (Bloom 1956). Likewise, Steinkuehler and Duncan (2008) argue that games (even "non-serious" games) can cultivate what John Dewey termed the "scientific habit of mind" in their players. The authors note that science literacy means more than rote memorization of a list of facts; rather, it requires the sort of situated decision making and hypothesis testing common to many gaming environments.

What is it about games that endows them with these capacities for contextualization and social encounter? The answer to this question evokes a long-

standing debate in the GBL literature, which Blakesley (2012) terms the "narratology and ludology debate." Narratologists tend to explain the success of games in terms of their function as narrative media (e.g. Dickey 2011; Habgood and Ainsworth 2011; Ip 2011), while ludologists contend that narrative structures actually *constrain* player agency otherwise fostered by interactive game mechanics (described in Blakesley 2011, Pearce 2005). Pearce (2005) pushes past this debate, suggesting that games not be classified as narrative or otherwise, but rather that they be seen as possessing narrative properties, which may lend contextual significance to interactive mechanics. From this perspective, a synergy appears between narrative structure and game interactivity. Take, for instance, the parallels between Barab et al.'s (2010) three spokes of "transformational play" (consequential context, socially relevant content, consequential action) and the foci of the "Three D Space approach" to understanding narrative structure (situation, continuity interaction) (Ollerenshaw & Creswell 2002). These approaches share an emphasis on contextualized meaning and the experience of individual agency: for GBL designers, these are the keys to deeply impactful learning. Despite this emphasis on situated meaning and the importance of context *in-game*, many studies *about* games elide the impact of the classroom context on gameplay itself. The trend is instead to treat games as discrete activities whose internal narrative can be engineered to maximize student achievement (see Wouters et al. 2013 for a recent meta-analysis of such studies).

Studies of student outcomes have value in their ability to dialogue with existing forms of education and educational assessment. However, the assumption that a

player's experience can be perfectly engineered neglects the fact that all games are embedded in the larger day to day experiences of human beings, and that serious games are situated within a student's experience with their formal learning. Valid hopes have ignited at the prospect of using games to bridge achievement gaps, foster students' motivation to learn, and bolster their sense of self efficacy; and the literature is full of recommendations for designing games that do these things well (e.g. Barab 2010; Ip 2011). The problem is that in such stories it is the *game* that is the hero, charged with saving students from the dreaded bad outcome (a poor grade, a drop in self-reported interest). This emphasis on game as unit of study, coupled with a tendency towards quantitative methodologies that evaluate student experience in aggregate, leaves many voices unheard. In-depth interviews with students regarding their GBL experience are far less common in the literature than quantitative studies.

This imbalance may explain the curious findings of Wouters et al. (2013). The authors analyzed 39 studies of GBL implementation and found that, overall, games resulted in statistically significant improvements in content mastery compared to traditional methods of teaching the same content. However, affective variables did not appear to benefit: games did not enhance students' motivation to learn any more than traditional instruction. This seemed odd, given that proponents of GBL often advocate games specifically for their motivational effects. Should we therefor discount games as motivational tools? I do not believe we understand enough about serious gameplay to support that conclusion. We do not yet know how students themselves experience game play *as a part of* their larger academic careers. Just as the context a game creates

is essential to a student's learning, so the context in which a game is played is essential to a player's experience. It is this experience that mediates learning outcomes, but as Squire (2005) puts it, we have only begun to learn "what happens when games enter the classroom."

To engage this question in a way that both honors the spirit behind serious game development and informs the process of implementation, we must get to know the students who play serious games. In my study, I focus on this directly, foregrounding the identities students recruit in their narratives of classroom gameplay. This approach takes the power of narrative seriously, asserting that what GBL research has taught us about educational games holds true for educational research as well: if you want to teach a student, tell her a story; if you want to learn how to teach a student, listen to hers. In due course we will hear a great many stories from six individual gamers. To lend context to their tales, I will discuss our current understanding of gamer and student identities and how these interact in the classroom setting.

Selves to Listen For: GBL Scholars Describe Identity

I have identified the problem that many studies of serious treat player identity as a complicating variable rather than a paramount feature of player experience. This is, of course, not the case throughout the whole of GBL scholarship. While there are few studies explicitly investigating the identity work students perform while engaging with games across multiple contexts (Burke 2013 and DeVane 2012 are valuable examples), there is a great interest in the impact of gameplay on identity development as well as

the impact of a player's identity on their personal experience of gameplay. Overall, the games and learning literature treats identity as fluid, multiple, discursively practiced, socially situated, and functionally bound by literacies (Gee 2007, Squire and Steinkuehler 2005). This sensitivity to setting as an influence on individuals' physical and psychological sense of themselves exemplifies a larger agreement within the GBL community: to dissolve the mind/body dualism in favor of more integrated approaches to identity (Barab and Roth 2006; Chee 2007). This stance brings social and temporal variables as well as issues of embodiment into focus as important concerns for the GBL identity theorist. I will first survey some broad trends in the literature that touch on these variables, then proceed to a more in-depth look at several writers whose work is particularly relevant to the present study.

Investigating the significance of social interactions for identity formation, Holmes (2012) offers an analysis of the "projected" nature of the self. Multifaceted, this characteristic of identity experience is the negotiation of an individual's intentionality and the constraints on her action (embedded in the game mechanics or enacted by fellow players in a social game such as a massive multiplayer online game or MMOG). In other words, identity is the nexus between those aspects of ourselves that we project into the world and those which others (game designers or our peers) project onto us. Holmes further addresses the performative and punctuated nature of these identities. This definition leans toward a narrative conception of identity as something performed and constituted in discrete, tellable incidents. Taking a more forward-looking approach, Lee and Hoadley (2007) suggest a "possible selves" model for examining student

identity development. These authors contend that it is not only the interaction of projections and performances in the present that make a player a certain "kind of person" (Gee 2000), but also the aspired to or feared future selves that players imagine becoming as a result of gameplay.

Peachey and Childs (2011) address the issue of temporality by examining identity on two different time scales. The authors describe these two vantage points as the nominal and self-informative identities. The nominal self can be easily communicated to others (projected out in Holmes' terms). This view is constructed to be reasonably fixed and identifiable over time; it lends continuity and permanence to the individual's performed identity. The self-informative perspective, on the other hand, is far more fluid. This identity responds to changes in an individual's sense of self as contexts shift. Likewise seeking to orient two seemingly opposed perspectives on identity, DeVane (in Rick et al. 2012) proposes the use of wholly different frameworks when investigating identity over different scales of time. DeVane seeks to resolve the apparent conflict between the developmental approach to identity from the field of psychology with interactionist and performative perspectives. The former, he argues, affords a powerful lens for analyzing identity change over time, while the latter yields a finer image of identity over shorter timeframes. Essentially, DeVane suggests we turn to psychology to understand the nominal self, and to social theorists to understand the mercurial self of the present moment.

Through these writers, we can see a clear trend in the GBL research on identity. Context is paramount, and identity multiple and fluid. We not take a closer look at

theoretical models from two prominent GBL thinkers that synthesize the findings we just reviewed into coherent frameworks for research.

<u>GBL and Identity: Key Players</u>

The godfather of games and learning research, James Gee provides several foundational insights into the relationship between identity and gameplay. Broadly, he defines identity as the property of being recognizable as a particular "kind of person" in a given context (Gee 2000). For Gee, identities are created and maintained through the interactions of "big D" and "little d" discourses, the former constituting the cultural assumptions and mores of a given set of people while the former indicates the "language in use" that indexes and constitutes the day-to-day articulation of Discourses. The identity a person inhabits when they sit down to play a game is a grand conglomeration of many roles situated in many d/Discourses: a person may be a daughter, a 10th grader, a violinist, a cat-lover, a cancer survivor, a best friend, a "lefty," etc. Once the game begins, however, two other identities come into play (Gee 2007). The first is the "virtual" identity, the character a player plays in-game. This identity can be very different from the player's, even fantastical. In a video game, anyone can become an elf or a soldier or an adventurous archeologist plumbing the depths of the earth to search for treasure. The abilities and characteristics of this virtual identity are set by the game designers. The final identity Gee terms the "projective" identity. The interface between real-world player and virtual character, the projective identity hinges on intentionality and imagination. To capture this identity, you must answer the

question, "what sort of elf/soldier/archeologist do *I want to be*?" The actual playing out of the virtual character by an individual real-world player yields a wholly new identity defined by the goals of the player acted out through the constraints and affordances of a designed being.

Barab et al. (2010) pick up a similar thread, focusing on the virtual and projective identities in order to suggest design principles for creating characters in educational games. These authors seek to create games that allow those who play them to achieve meaningful learning within a virtual world. The authors do not specifically align their work with Gee's construction, but they emphasize the need for virtual identities that enable players to make their own decisions (exhibit intentionality) in a context that responds significantly to the actions the virtual character executes (they describe this as creating a "context with consequentiality"). Finally, they stipulate that the game's informational content must not be incidental to the character's actions. In order for a virtual identity to support a significant projective identity, the character must have access to information that is explicitly related to the available goals this character might pursue. Stepping back, the authors note that the people, places, and information in a serious game should walk a fine line between engagement and detachment. Without the former, the game is just another lesson. Without the latter, the student has no room for objectivity and reflection. If designers succeed in striking such a balance, the authors argue that it would generate "transformational play." This term sums up another general theme that runs throughout the GBL literature: the conviction that the power of play lies in its ability change the identities of its players.

These precepts represent applied versions of a broader theory related to identity in games and learning, which Barab and Roth (2006) set forth by adapting ideas from Gibson (1986). Describing an "ecological perspective" on curriculum design, the authors seek to support "meaningful relations" between individual students and their classroom contexts. The premise of their argument is that individuals and their contexts cannot, in fact, be easily separated. Invoking the concept of the "life-world," the authors conceptualize an individual as the heart of a personal perceptual reality. Depending on the attunements and intentions of the individual, he will have a distinct experience of the environment he inhabits: the "life-world is the world given to the acting person in his or her perception and, therefore, the world as it makes a difference in and to his or her life." Quoting Agre & Horswill (1997, p. 114), the authors offer the simple, illustrative example of a kitchen space that "affords a different kind of life-world to a chef than to a mechanic." Both people see the same space, but it offers different affordances to each, and each brings different "effectivity sets" (essentially skills and practical knowledge) with them (Barab and Roth 2006). These differences offer one way of understanding the identities of the chef and the mechanic.

The idea that an individual's identity is wrapped up in the environment as it is perceived by the individual is one of the purest conceptualizations of the popular idea of "embeddedness" as an essential element of identity-driven gameplay (Chee 2007). Barab and Roth (2006) are explicit on this point, explaining that "the organism and its life-world … are defined in terms of one another: They are structurally coupled and therefore cannot be theorized as independent entities." While many researchers will

take the pragmatic route and in fact theorize these two sides of the identity coin separately, the tight connection between a player or student and their perceived context underpins most GBL research into player identity (Gee 2007, Squire 2006; Steinkuehler and Duncan 2008).

Life Worlds at Odds

The game-based learning movement was inspired by the difference between the life world/identity complexes common to people engaged with games vs those sitting in classrooms. We see games as engaging and fun; the Gamer is someone who sees opportunities to challenge themselves and others, and easily accepts failure as a given of trial-and-error play. Students, especially undergraduates, on the other hand, are renowned for their ability to identify the most tedious aspects of learning and languish in bouts of route memorization, all the while paralyzed by the fear of a poor grade. The promise of GBL is its ability to integrate the motivation of a Gamer's gameplay into the life-world of a Student's classroom. The peril of GBL is that these life worlds may be incompatible. Understanding how these life worlds (and the identities associated with them) interact is my goal in this study. As we have just seen, however, identity has a great deal to do with social interaction and culturally inherited expectations. Therefore, before we go looking for the Gamer and Student identities my participants describe, it behooves us to get some sense of what being a Gamer looks like, and how researchers have found this identity to cohere or conflict with Student identities.

"Meet the Gamers"

Squire (2006) suggests that every student has within themselves a gamer identity, born of informal experiences with games outside the classroom. Given a well-crafted educational game, this identity can be "enlisted" in the service of powerful learning. To understand the implications of bringing a game into a classroom, we must first understand the identity Squire wishes to call forth into the foreign land of scholastic pursuits. Toward that end, we turn to suggestions in the research about what makes a gamer recognizable as the kind of person who plays games. By no means a fixed set of traits, the gamer's manifold characteristics are still worth getting to know. Whether or not a particular student identifies as a hard core gamer, she is subject to the collective assumptions of our culture about what it means to play a game. Our understanding of the gamer identity will help us grasp the identities being projected onto student-players, before we examine those that they project out. The interplay of these projections shapes the identity work students undertake in GBL activities.

If I had to select one adjective to describe the gamer, it would be "competitive." Whether the term is implicit in descriptions of players who strive to best their peers or their own past achievements (Gee 2007), explicit in taxonomies of what makes games enjoyable to students (Quick and Atkinson 2011), or evident in the laments of researchers struggling to create a truly collaborative game (Zagal et al. 2006), the drive to contend grounds the gamer's sense of self. It is the engagement inherent in this drive that makes games so attractive to educators. Of course, before they consider games as tools in the classroom, researchers note the importance of games on the identity development of the world's youth. Arguing for the significance of games to field of

developmental psychology, Blumberg and Fisch (2013) urge us to "acknowledge that digital games have become an integral aspect of children's and adolescents' lives." Assuming the inextricability of an individual and the environment as they perceive it, identity researchers must understand the formative role that games play in the psychological development of students before they even enter the classroom.

Mitgutsch (2009) investigates this question directly, interviewing 8 young adult college students about their "play biographies," accounts of the most significant games they played at each stage of their lives. The author describes rich interviews around timelines participants created to visually explain their meaningful play experiences. The games players discussed formed "a central role in their cognitive and emotional development throughout their lives." Significantly, the most meaningful games were not always those that participants spent the most time playing. Instead, the unifying characteristic among these games was that they "opened up a novel learning challenge." This is consistent with Gee's (2007) observation that games are effective learning environments because they maintain a constant level of appropriate challenge – just hard enough to make effort worthwhile. And indeed, "challenge" was another of the characteristics undergraduates cited when describing an enjoyable game (Quick and Atkinson 2011).

If gamers are recognizable by their desire to seek out challenge and pursue victory, they are equally characterized by their deeply held sense of agency. No matter how many hours game designers put into crafting the perfect virtual world, it is still the gamer who decides what that world will mean to her (Johnson 2012). As Squire and

Steinkuehler (2005) put it, "game cultures… blur the distinction between the production and consumption of information" (p. 1). Steinkuehler (2006) goes one step further, suggesting that gamers "are both creators and consumers of the *'kinds of people'* available within the game" (p. 49, emphasis added). This assertion underscores the central role of the projective identity (Gee 2007) in a player's larger identity project. Without a sense of intentionality, a gamer cannot truly be a gamer.

In this emphasis on personal agency and competitive drive, we must not lose sight of the role of community in sustaining gamer identities. Counter to portrayals in the media, "the stereotype of the gamer [as] a lone teenager seated in front of a computer" is misleading (Shaffer et al. 2005, p. 4). The same authors who listed competitiveness as one of the primary sources of enjoyment for undergraduate gamers also include companionship (Quick and Atkinson 2011). Gamers participate in rich social worlds, mastering a suite of little-d discourses to "index identity and membership" in the larger Discourse of gameplay (Steinkuehler 2006, p. 43). Games are emerging as new "third spaces" for informal social networking (Steinkuehler and Williams 2006) with the unique feature of permitting *identity* play as well as gameplay. In these spaces players project their sense of self through their social literacy practices, enacted values, and unique use of resources (Martin 2012, Burke 2013).

The relationship between communities in game spaces and interaction in the real world is complex. This is partly because there are several ways to decompose the system of communities that constitutes gaming culture. MMOGs like *Lineage* or *World of Warcraft (WoW)* often put total strangers who may never meet in real life into

intimate on-screen interactions. Here, avatars become the social interface of the playing community. Avatars allow for a culture of pseudonymity (Squire 2006): speaking through these constructed characters, a player may feel aspects of their off-line identity (such as gender, age, or race) become irrelevant in the game space (Squire and Steinkuehler 2005). For many, this is liberating. At the same time, these off-line aspects of identity can be highly salient to the game world in unexpected ways. As Childs (2011) reminds us, "The constraints on the choice of appearances are not only external ones" (p. 19). By external choices, Childs means the options provided by the game designers. These are not the only constraints on a player's choices, however. Many gamers feel pressure to gender identity or to conform their avatar's physique to aspects of their own. This is unfortunate, because when players are able to branch away from these constraints, they can explore new ways of being in the virtual world. Acting through an avatar of a different age or gender, players can "test the extent to which this [different identity] connects with their conception of self" (p. 21).

The kind of gamer a person is within a gaming community also depends on the way she prioritizes in-game activities or leverages particular resources around gameplay. Martin (2012) demonstrates the fascinating diversity of information seeking strategies among young players, using these to explicate "fine-grained identity" (p. 391) variations beneath her participants' ubiquitous gamer affiliations. Similarly, players often highlight their preference for different pathways through digital games as a means of signifying their identity as a type of gamer who holds a specific set of values. This may mean focusing on winning prizes by competing with other characters as opposed to

purchasing prizes through a game's website (Burke 2013) or relating to race and violence in popular video games in ways that cohere with one's social cohort (DeVane and Squire 2008).

DeVane (2012) describes the way in which different identity performances emerge from different social contexts around gaming. His informant, 8 year old Salim, foregrounds his roles as brother and preadolescent male in turn even as he continues to act as a gamer. When his brother is around, Salim acts to please him; when his friends appear, he behaves more violently. These shifts echo the gymnastics of one of DeVane and Squire (2008)'s participants. This young man earnestly informed the researchers in personal interviews that his interest in *Grand Theft Auto* was based on his passion for car design and not violence. However, when his more rowdy friends joined him to play socially, he enacted a very aggressive gamer identity. Being a gamer is much more complicated than simply identifying as competitive and enjoying imaginative exploration; it's about participating in communities both inside and outside the virtual world.

These intersections of identity are what make a gameplay in a classroom such a rich setting for research. When the role of student is foregrounded by the classroom context, how will players engage their gamer identities? Do today's students see their student and gamer selves as commensurable? What identity will players privilege during a GBL exercise? As previously suggested, the apparent tension between the classroom context and the context of a game stands to ignite an identity crisis for students engaged in GBL.

The Student as Gamer

> The next major problem in virtual world learning is the tension between changing concepts of the academic's identity and role in learning. (Adams et al. 2012, p. 298).

There is a pervasive tension in the games and learning literature between fun and learning. Students are often concerned about on how gameplay connects to grades (Markey et al. 2008), unsure how to behave as academic learners in a game context, and vainly looking for the quantifiable outcomes of fun (Adams et al. 2012). The common theme among these attributes is their orientation to authority. Students derive their sense of identity from a culture of standardization where defiance is punished and compliance rewarded. Entering this culture, games can have a democratizing effect on a classroom. Suddenly, the locus of control shifts from teacher to player, the utility of learned content becomes explicit rather than promised by an authority figure, and information becomes a usable tool instead of a passively received bequest (Barab et al. 2009; Blumberg and Altschuler 2011). As players submit to (and sometimes create their own interpretations of) the rules of the game, the traditional classroom hierarchy is disrupted (Pelletier 2009). This can be seen linguistically in student discourse around simulation games, in which the incidence of "I" statements increases dramatically compared to their frequency in normal classroom activities (Fies and Langman 2011). Students find their voice and use it to join a different Discourse – a culture of agency, intentionality, and individual identity.

Recommendations for instructors who seek to implement educational games also reflect this tension between play and learning. Working with a board game, Kozak and Dvorak (2011) noted that a game can be an "evocative" activity (p. 58), but needs to be contextualized with reflective discussions or assignments to set students' intention to learn and convey information not captured in gameplay. The reason for this, the authors argue, is that games

employ a different grammar and set of practices than that used in school. In other words, the D/discourses of games and schooling do not appear to overlap. Rieber and Noah (2008) concur, suggesting that the type of thinking students engage in during gameplay is "experiential cognition," distinct form the "reflective cognition" characteristic of class discussions and assignments. The authors find the motivational power of experiential cognition extremely valuable and advise instructors to position it next to more reflective activities to ensure skill mastery and transfer.

Considering this friction or complementarity between fun and learning, we must be mindful that "concepts of our identity as students are tightly interwoven with our perceptions of what it is to learn and what this should involve" (Adams et al. 2012, p. 296). Do students perceive games as something that learning "should involve?" Students in classrooms where GBL curricula are being tested offer mixed perspective on the challenge of being both a student and a gamer at the same time. Some students see "learning in school and while playing video games as comparable" (Blumberg and Altschuler 2011, p. 101), others see games as "not so good for learning" and feel "sea-sick" switching back and forth between gamer and student selves (Adams et al. 2012, p. 288). It is noteworthy that this identity nausea can appear to vanish depending upon the research methods used to assess student perceptions. Ogerchock and Cottrell (2004) found that both instructors and students rated a pediatric board game highly creative, entertaining, and educational. Granted, in this study, participants responded to statements on a Likert type scale and were therefore not prompted by the grammar of debates about learning through play nor given the space to invoke it themselves. Still, in this context, participants clearly display that learning and fun can co-occur. This suggests the need for student's own voices to enter the literature if we are to get a full picture of their identity

experiences with GBL; it also soberly reminds researchers that the format of our questions has the power to manufacture or erase dramatic patterns in our data.

Lee and Hoadley (2007) see a focus on identity in game design as a way to begin reconciling the struggle between student and gamer identities for learners. By creating contexts in which players take on a meaningful identity in the virtual field of interest, and take actions that have consequences within the game – that is, by designing games for transformational play (Barab et al. 2010) – students gain "relevant experiences of who one could become [and are therefore] motivated to learn associated skills" (Lee and Hoadley 2007, p. 5). The hope here is to tie gameplay to the outside world. Content and skills mastered in-game should be consequential in the virtual environment, and this virtual environment should have resonance with the real world beyond. Design with an eye to the contortions of a player's identity "may be the key to the balance between engagement and learning, allowing the two to support, rather than compete with, each other" (p. 5). This is precisely the idea that drives a final powerful research perspective within the games and learning community, epistemic games (Shaffer 2005; 2006).

Games for Learning Revisited

When a student walks into a classroom and meets with a game, the identity stakes are high. Squire and Jenkins (2003) argue that every game is inherently about engendering the identity of "learner" in its players. The question for educators is, what kind of learner will that player become? For Shaffer, the ideal "learner" is a professional – that is, students should be able to learn in the way that professionals learn in the workplace (rather than in the often detached ways in which students learn in many classrooms). Advocating an approach to curriculum he calls "pedagogical praxis," Shaffer (2004) outlines the foundation for an update of the apprenticeship model of education.
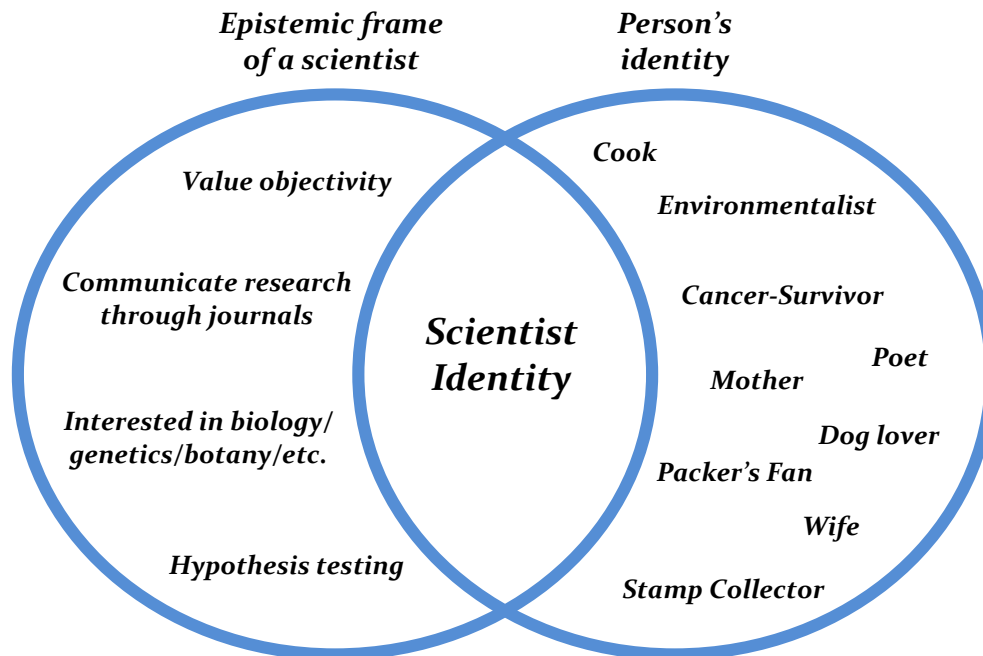
His goal is to "understand the relationship between activity and learning in the context of professional learning practices" (p. 1416). In this framework, Shaffer takes on not only identity but epistemology, axiology and social practices, making each the explicit training outcome of schooling in different professional disciplines. The combination of these elements comes together in epistemic frames, which are

> ways of doing, being, caring, and knowing … organized by and around a way of thinking. That is, practice, identity, interest, understanding, and epistemology are bound together into an epistemic frame (p. 1).

Epistemic games, then, are games designed to engage learners in the daily practices and mental habits of professionals, thereby learning as professionals learn in their native disciplines. These games look less intuitively game-like than other educational games cited in this review. Here, fun is less of a tool to harness students' motivation and more the byproduct of tackling difficult tasks in a real-world facsimile. This reversal eases the tension between student and gamer, as both identities fall to the background of the apprentice self and the "identity of expertise" (Shaffer 2006, p. 227) that epistemic games cultivate.

It is important to note that identity is only one component of an epistemic frame. By invoking Shaffer's work here, I do not mean to suggest that my study will examine epistemic frames in depth. Rather, I wish to highlight how a game context can foster the development of identities alongside the values, practices, and other elements that contribute to a complete epistemic frame. These elements are part of what pull a particular identity to the forefront of a student's experience and thus will be relevant signals of student identity development (Figure 5).

Figure 5. Example of how the epistemic frame of a scientist relates to the multifaceted identity of an individual. Note that the details included here are meant to be illustrative, not exhaustive. The key point is that engaging with an epistemic frame foregrounds a particular identity, but this sense of self is not sufficient to characterize the associated epistemic frame, which also includes practices, values, interests and other factors that contribute to a given profession.

Epistemic frame of a scientist

Person's identity

Value objectivity

Communicate research through journals

Interested in biology/genetics/botany/etc.

Hypothesis testing

Scientist Identity

Cook

Environmentalist

Cancer-Survivor

Mother

Poet

Dog lover

Packer's Fan

Wife

Stamp Collector

How exactly does this particular identity or sense of self emerge in the process of gameplay? To answer this question, researchers have often turned to avatars. One of the most convincing of these studies develops a concept called the Proteus Effect. In his lively dissertation, Yee (2007) defines this phenomenon as occurring when "individuals conform to stereotypical behaviors inferred from their digital self-representations" (p. 2). He shows powerful examples of people behaving more aggressively in simulations when their avatars were tall, and behaving more friendly when their avatars were attractive. Yee even found that this effect carried over to face-to-face interactions following a session with an avatar – participants were more aggressive in in-person

negotiations after identifying with an avatar of great height. These findings suggest one way of explaining the effectiveness of epistemic games: by playing a particular type of professional, students learn what to expect of such a professional and begin to adopt these expectations of themselves. As we saw earlier, however, while avatars offer opportunities for identity exploration, these opportunities are also constrained by the identities players bring to the game (Childs 2011). Understanding how these constraints and affordances interact in student GBL experience will be crucial for interpreting the results of outcome-based studies.

Avatars are thus an exciting point of entry for GBL study. However, they also complicate the particular identity question I am interested in: how students' understanding of themselves as gamers interacts with their understanding of themselves as students to yield an identity as a scientist (or not). Adding an avatar to this mix adds another layer of complexity to an already nuanced issue. To be exact, there are two broad avatars researchers may be interested in when investigating student experience with GBL: the in-game character and the identity of the Gamer itself, which is a metaphorical avatar students are asked to "play" in class when presented with a serious game. As we have seen, even when games and education seem to align in student perceptions, the two are still figured as discrete entities that can be put into harmonious or dissonant relation. Fortunately, there are no avatars in the NGame (unless students have a strong affiliation with tiny, circular plastic tokens). This allows us to isolate the identity of the Gamer as the sole avatar at play when students engage with the NGame.

While a gamer is not one of the professions Shaffer likely has in mind when he advocates for epistemic gaming, the identity carries with it a frame of mind and assorted skill set that could greatly benefit a student. As noted previously, game logic often parallels scientific thinking and learning practices (Mayo 2009). The ability to discriminate between useful information sources, the self-competitiveness to continue questioning, and the pleasure of exploration are all vital traits for successful students and scientists alike. The NGame was not designed to turn out professional scientists, but to educate college students about a ubiquitously important concept in the sciences. Still, I wanted to understand who my participants became when they engaged with the game's content as both gamer and student simultaneously. Taking a narrative approach, the central research question of my study became the following: **what identities do students recruit in order to characterize themselves in their game-based learning stories and how do these identities change over the course of the narrative's development?**

Conceptual Framework

Narrative inquiry offers an exceptional lens for analyzing questions of identity exploration while honoring the authenticity of student voices. Drawing insights on identity from the fields of both narrative inquiry and games and learning, I will now establish a conceptual framework to unify my discussion of 6 unique accounts of students in ecology classrooms playing the NGame. This framework characterizes both the specific identities students brought to life in their narratives as well as patterns in the way these identities changed. To borrow a metaphor from physics, I will be examining both the "wave" and "particle" nature of identity, in

order to take a holistic look at this crucial element of student experience. To accomplish this, I fused a model of identity from the games and learning literature with a model of narrative from comparative mythology. These two seemingly separate models mesh well together and afford a rich framework for thinking about the complementary aspects of student narratives. I will begin by looking at identity's "particle" aspect through the tripartite model laid out by James Gee (2007). With this perspective in mind, I will explore one model of identity's "wave" aspect, Joseph Campbell's description of narrative morphology, the "monomyth" (1949). Taking the particle perspective will allow us to ask specific questions about how students conceptualize their various senses of self in relation to one another; the wave perspective will allow us to see how these relations shift through the course of gameplay.

First, recall that in the absence of avatars in the NGame, I am focusing on the identity of the Gamer as the "virtual" identity students assume when they engage with the NGame. I will use James Gee's model of player identities to understand how the "real world" identity of the Student interacts with the "virtual" Gamer to create a "projective" identity (which educators hope will be the Scientist, but which may be any number of other things). For my purposes, I use "Scientist" to describe this identity – as opposed to "biologist" or "ecologist," for example – for two reasons. First, the types of thinking that the NGame encourages are applicable to most scientific fields, as will be discussed in more detail in my discussion. Second, as the students are not engaged in a domain-specific task (such as the lab work of a chemist of field surveys of an ecologist), the identity affiliations they are likely to develop are those of general scientific professionals.

With Gee's framework to help us characterize these three important identity "particles," I turn to Campbell's work for the "wave" half of the identity equation. Campbell (1949) describes a classic narrative arc which he terms the "monomyth" or hero's journey. At its heart, this storyline is a pattern of personal transformation and interior struggle – precisely the sort of stories I expected students to share when discussing their GBL identity experiences. In brief, the hero's journey consists of three phases: Separation, Initiation, and Return (for more detail, see Figure 1). These phases align nicely with many education theories that describe the process of learning as a cycle involving a shift in attention to a particular question (Separation), a struggle to master concepts or work out an answer (Initiation), and finally an application of what was learned to new problems (Return) (e.g. Dewey 1938; Kolb 1984). For my purposes, the Separation occurs when students are introduced to the NGame and thus drawn away from their standard curricular activities; the Initiation occurs during gameplay; and the Return refers both to the conclusion of the game and the conceptual transfer we hope occurs between gameplay and the students' other learning efforts. At each of these phases, I expect different identities to be at work. Exploring the interactions of Gee's model with Campbell's narrative arc will allow us to examine the particular identities that emerge during classroom gameplay and how those identities interact and change (Table 1).

Figure 1. Common depiction of the hero's journey (en.wikipedia.org). In this depiction, crossing the threshold from the known to the unknown constitutes the hero's Separation; the challenges and revelation in the abyss constitute his Initiation, and the Return occurs as he crosses the threshold back to the known world.
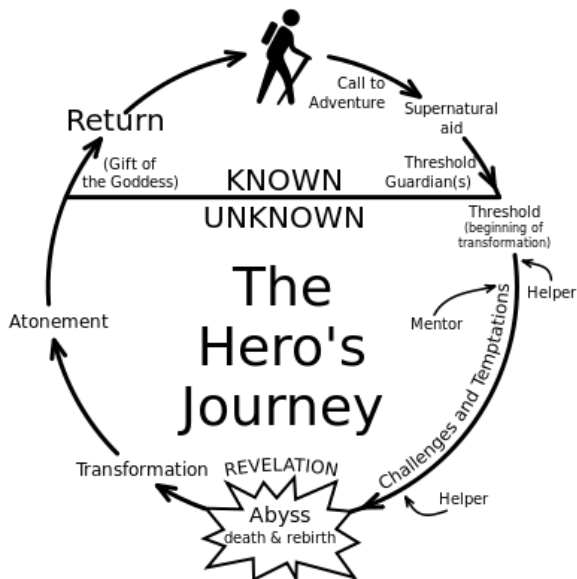
Table 1. An overview of the intersection between Gee's identity typology as conceptualized within Campbell's monomyth.

Identity Types	Identity Development		
	Separation	Initiation	Return
Real world (*Student* as Gamer)	The Real World identity is established, and the narrator describes leaving the familiar world for the virtual.	The Real World and Virtual Identities are depicted as being in conflict or opposition. If the hero is successful, an emergent synthesis is recruited to relieve this tension.	The Projective Identity is elaborated and either brought back to the real world as the gateway to new learning in new professional communities, or abandoned outside the context of the game.
Virtual (Student as *Gamer*)			
Projective (Student *as* Gamer)			

A more in-depth explanation of each theory and their interactions follows.

Gee and Campbell at the Game Board

Exploring the learning principles embedded in popular digital games, Gee offers

us an elegant typology for investigating the identities at stake in gameplay and,

ultimately, any learning endeavor. He calls these identity types the real, virtual, and

projective, and identifies them by emphasizing different aspects of the whole they

comprise, the "player as virtual character" (p. 53). The first is the player's "*real-world*

identity… [as] a nonvirtual person playing a computer game" (p. 50, emphasis in

original). This is the identity players bring with them to the gaming experience, and Gee

identifies it rhetorically with the phrase "*player* as virtual character" (emphasis added to

mimic Gee's convention) in which the italicized term indicates the accentuated identity

in the larger relationship under examination. Importantly, Gee acknowledges that the

player will "have a good many different nonvirtual identities" (p. 50), offering several of

his own such identities as examples: "a professor, a linguist, an Anglo American, a

middle-age baby boomer, a parent, an avid reader" etc. This concept of identity being

multiple and somewhat unstable resonates with many narrative researchers (e.g.

Clandinin and Connelly 2000; Kondo 1990; Nelson 2001). Like these authors, Gee urges

us to consider which of a person's various possible identities are most intensely

activated by a given context – in this case, the gaming experience. When we turn to the

student narratives in my study, we will see that an identity I will call "the Student" is by

far the one that is most commonly foregrounded.

Shifting the emphasis to the other side of the identity relationship, Gee explains

another of his three game-play identities as the "player as *virtual character*." Here, the

emphasis shifts to the character a gamer plays, the "virtual character in the virtual

world" (p. 49), complete with the affordances and constraints specific to the virtual

context. In the example Gee presents, he plays a "female half-elf… named 'Bead Bead'"

(p. 46) in the video game *Arcanum: Of Steamworks and Magick Obscura*. In the game, Bead Bead has certain degrees of ability in various areas (such as intelligence and persuasion), determined by the game's presets for elves and Gee's allocation of additional modifier points. These abilities are specific to the virtual world of the game, and while Gee has a hand in directing Bead Bead through this world, it is "a world [he] did not create. Thus [he] is, in this sense, not responsible for her successes or her failures" (p. 49). In short, a player's virtual identity is one he is furnished by the game itself, an identity he takes on and can manipulate, but whose characteristics did not derive primarily from his own narrative work.

The final identity is the least straight-forward, but pedagogically the most interesting. Essentially, this identity is an emergent property of the interaction between the former two. Called the "projective" identity, and represented by emphasizing the word "as" in the "player *as* virtual character" construction, this identity is the result of the particular real-world player acting through the virtual character. Gee explains it thus:

> A third identity… I will call a *projective identity*, playing on two sense of the word 'project,' meaning both 'to project one's values and desires onto the virtual character'… and 'seeing the virtual character as one's own project in the making, a creature whom I imbue with a certain trajectory through time defined by my aspirations for what I want that character to be and become (within the limitations of her capacities, of course, and within the resources the game designer has given me) (p. 50, emphasis in original).

Here, relationship and intentionality are in the forefront: how does the player relate to his character? what does he intend for this character to do, be, or become within the

virtual context? how do the successes and failures of the virtual character bear on the life experiences of the player?

The final two identities are more complicated to locate in my participants' narratives than the real-world identity, since the game these students are playing is a board game and not a role-playing game. These students have only small plastic tokens and cards with (albeit beautifully rendered) bacteria to work with. In short, there is no obvious anthropomorphic character for them to "play" as there are in many serious digital games that cast their players in the role of a scientist (e.g. Citizen Science, Quest Atlantis) (Barab 2010). We can resolve this confusion by appealing to Gee's transposition of the three identities into a general pedagogical setting. Throughout *Video Games*, Gee reminds us that while games may be powerful tools in education, they are also resources replete with lessons for all educators. In keeping with this idea, he explains that the three identities described above correspond to any educational settings in which students are expected to experiment with new identities, usually professional identities. The example he provides is of students in a science class. During the course of their lab work, these students are essentially being asked to take on the "virtual" identity of a scientist. By following sets of explicit and implicit practices modeled by their teacher as well as popular ideas of what it means to be a scientist, the students get to "play" a scientist in class. In Gee's shorthand, we would describe the identity of interest here as the "student as scientist." Just as with video games, the real-world student (*student* as scientist) interacts with a given virtual identity (student as *scientist*), and through their choices about what type of scientist to be and their

reactions to the successes and challenges they encounter in the virtual world of the laboratory, they develop a projective identity (student *as* scientist).

For my purposes, the virtual identity students take on is that of the Gamer. (I will capitalize this and all other identity types to avoid confusion with references to gamers or students in general.) When bringing the NGame into their classrooms, the educators I worked with wanted to help students think like scientists. However, unlike the lab work in Gee's example, or other activities we could imagine students undertaking to play the virtual identity of "scientist" (such as research, writing, data analysis or formal presentations), gameplay does not intuitively resemble the practice of science (though I have seen many an accomplished scientist play the NGame with delight). Instead, the "virtual" identity we are dealing with is the Gamer that the NGame invites each student to become. Presented with a game designed for learning, students are expected to take on the role of the fun-loving, competitive game player. This was the crux of my initial interest in student narratives about game-play: this virtual character seems so at odds with the real-world identities activated by the academic context that I wondered how students could make sense of this collision of selves.

What does it mean for our pedagogical goals when the Student becomes the Gamer? Importantly, the "scientist" identity does not disappear in this scenario: in fact, it is located precisely at the interface of the two identities. The Scientist is the Student *as* Gamer. To be more precise, this is the pedagogical intent behind the design of serious games: educators hope that the Gamer identity will energize the Student identity, enabling the student to identify more meaningfully with a target professional

identity. As we will soon see, this is not always so easily accomplished. Regardless, the projective identity of Student *as* Gamer reflects how the student decides to behave as a gamer in a classroom setting. It is in the dynamics of this decision that are of import to GBL researchers, because we need to understand how the goals of GBL align with the actual experiences students have with games in the curriculum. Exploring particular identities is a good start, and Gee's model is beautifully sensitive to nuances in identity characteristics in both educational and game environments. To complement this "particle" view of identities as bounded, interacting units, I turn to narrative for a lens on identity evolution. I now ask, how can the shape of stories help us understand the "wave" view of identities as they morph through plotlines?

There is a strong tradition in narrative inquiry of using story to understand self. Researchers access the issue of identity by way of various analytic roads. Through their writings, we see story become a way for individuals to create a coherent, socially sharable self (Linde 1993), to negotiate a balance between the appeal of coherence and the desire to honor life's complex and chaotic experiences (Ochs and Capps 2001), to organize the experience of living "storied lives on storied landscapes" (Clandinin and Connelly 2000), to repair negative experiences with others and reconcile negative experiences within ourselves (Nelson 2001, Capps and Ochs 1995). Dan McAdams (1988) perhaps takes this theme furthest by defining identity *as* a life story, an equation echoed by Sfard and Prusak (2005). The latter authors note that identity is especially of interest to educational and social science researchers, who tend to prefer it to the closely related terms of character, personality, and nature. Unlike these terms, the

concept of identity locates creative agency within the individual and her interaction with others rather than appealing to biological determinism or other theories of reality-as-given. While I will often use the term "character" interchangeably with identity (in the sense that the character in personal narratives represents the narrator herself), highlighting the creative work of the individual in telling her personal truth is vital to an analysis that honors the goals of GBL. As such, this emphasis was particularly important considering in my selection of a model with which to analyze the morphology of my informants' narratives.

The standard template used in narrative inquiries to describe the shape a story takes comes from Labov (1972). This framework identifies six key aspects of narrative: abstract, coda, evaluation, setting, characters, and complicating action. The abstract introduces the main idea of the narrative, the setting and characters relate the context and key identities that will be active during the story, the complicating action is what we normally think of as the plot, the events that happen during the course of the narrative that move the story along, the evaluation is a summative point or moral about the story and the coda functions to mark the conclusion of the narrative as a whole (Riessman 2008). Not every story will have each of these elements, but they capture the common building blocks used by narrators.

While this framework is very effective at summarizing the structural elements of a narrative, the questions I raised in the course of my study stand to benefit from a more flexible model of how identity changes (or solidifies) over time. While clear narrative impulses were evident in the animated way students related their thoughts to

me, their utterances were not always amenable to a linguistic breakdown of the sort Labov's model encourages. By using rhetorical (as opposed to content or theme-based) markers to discern the boundaries of "abstract" and "action," Labov's model privileges narratives that are constructed coherently enough to be identified as discrete stories. While this is quite useful in many narrative inquiries, the stories that came out of my interviews were often distributed across several topics of conversation.

While there are certainly several coherent stories within the many conversations I reviewed, these neatly bounded tales do not account for all the narrative work that my informants undertook. In many cases, to cut and paste fragments together into a traditional story would eclipse the identity work students performed in the interstices of interview dialogue. Ochs and Capps (2001) helpfully remind us that not all narratives aspire to the criterion of coherence. While Linde (1993) makes much of this metric of narrative value, working as she does to understand how her informants see their lives as meaningful wholes, Ochs and Capps point out that in more conversational story-telling, narrators often foreground the unexpected convolutions of their lives. Doing so evokes a sense of authenticity, which may be more valued in these contexts of intimate human interaction than smooth accounts with clean plotlines. We can hypothesize that students likely struggle to communicate in a way that coheres the complex elements of their GBL experience because of the arguments made previously about the liminal nature of classroom gameplay.

There is also my students' age to consider. As young adults in higher education, they occupy a uniquely transformative life space for identity development. Following

Erick Erickson, McAdams (1988) notes that teenagers and young adults experience a state of psychosocial moratorium during which they experiment with different values and identities before settling into the prominent roles of their adult life. While I think many narrative inquirers (e.g. Grumet 1987; Kondo 1990) might challenge the notion (or at least the permanence) of a stable identity, the fact remains that, in Western culture, college represents a time explicitly set aside for career development and "finding oneself." The pressure to create a coherent self is building, just as the opportunities to try on a great many new identities flourish. Moreover, Gee invokes the idea of a psychosocial moratorium in one of his learning principles derived from computer games – he posits that games afford students a safe space to experiment with ideas and selves, failing far more often than they succeed. This, he argues, is the essence of learning. Therefore, if we are interested in the kind of identity work students engage in in classroom gameplay, and if we are curious about whether the coherent identities we hope they will be able to experience ("scientist," "critical thinker," "informed citizen," etc.) are in fact part of the gaming experience, we need a conceptual framework attuned to identity and sensitive to unexpected linguistic shapes of narrative in interview contexts. In other words, we need a model based on common narrative incidents and depictions rather than linguistic structures. This will allow us to catch the evolving narrative in the flashes and asides of more conversational exchanges.

I find such a model in Joseph Campbell's hero's journey, or "monomyth" (1949). As Campbell describes it, the hero's journey describes a pattern common across mythologies, popular contemporary narratives, and psychoanalytic interpretations of

dreams. "The millennial adventure of the soul" (p. 251), the hero's journey is a story of identity development and learning where what is learned is nothing less than the relationship between the self and the world. Campbell's electric prose serves to energize our reading of seemingly innocuous remarks; it seems somehow appropriate to analyze stories of gameplay in terms of the epic archetypes of myth and legend.

Campbell goes into great detail about the standard elements that comprise the monomyth; here, I will focus on the principal stages, noting the resonance they evoke with theories from the game-based learning literature and, of course, Gee's three-part model of student/gamer identity. These interconnections are in large part what make Campbell's narrative model a robust way of exploring student narratives, so I highlight the specific questions we may ask about Gee's identity perspectives at each stage of the hero's journey. The end result is an orientation for examining student identity work within game-based learning scenarios that will then be used to describe the types of identities six students recruited during their tales of playing the NGame in ecology courses.

For Campbell, the "hero's journey" is a "marvelously constant story" (p. 4). In more scientific terms, he has created a highly robust model for describing tales of personal enlightenment and learning that appear across cultures and across narrative scales (that is, similar patterns appear in epic mythologies kept alive by civilizations as show up in the dreams of individuals and the folklore of isolated communities) (Campbell 1949, Frazier 1890). I should make clear at this point that I have no interest in interrogating the ontology implied by Campbell's statements that the hero's journey

and other archetypes are "spontaneous productions of the psyche" (p. 4). It is enough that his model is effective at describing a common narrative morphology; I am not seeking a shovel to dig out "the Truth" of students' identities, but a lens to help us see "a truth" each student created with me in the reflective interview context.

Campbell describes this lens, the monomyth as "the nuclear unit" of narratives of transformation, "[the] standard path of the mythological adventure of the hero" and "a magnification of the formula represented in the rites of passage: separation – initiation – return" (p. 30). These three stages comprise the basic building blocks of the monomyth model and all center on a single hero's personal quest for life, enlightenment, community. This process is figured as "a separation from the world, a penetration to some source of power, and a life-enhancing return" (p. 35). These are the three stages (Separation, Initiation, Return) that I will code for in my data in order to elucidate the ways in which students describe their identity development throughout their narratives. If all three stages are apparent, we have a view into the identity work that is being done; if stages are missing, we can interrogate that silence.

We should expect different students' stories to look different from one another, since each individual inhabits and interacts with the world in a unique way (recall the life worlds Barab and Roth (2006) describe as characteristic of individual identities). However, the telos of these tales, as described by the monomyth, will always be an exploration of a world that is characteristically *other*, a metaphorical underworld or shadow land. The ultimate revelation constitutes a reconciliation of this unknown land with the known world. In the terms of Gee's identity model described previously, the

known world is the "real world" known to the "*player* as virtual character": in our case, the classroom of the Student. The unknown land will be the game itself, and the virtual environment it implies – not simply the world depicted on the board, but the world of a game in a classroom setting. If students realize a unity between the two contexts, it will be through their projective identities. The question for GBL educators will be: is this projective identity compatible with the identities we wish our students to take on as a result of their learning experience? This is where the rites of passage metaphor rings especially true.

The first step in this journey toward a new identity is the phase of Separation: the hero must leave behind the normal world of everyday and cross into a land of confusion and surprise, for "the adventure is always and everywhere a passage beyond the veil of the known into the unknown" (p. 82). For our purposes, this means the hero must cross into the virtual world of game-based learning. Again, this experience is virtual in the sense that playing games in the classroom is an unusual event, which implies a new role the student must play: that of the Gamer. Since this role, as identified, is foreign to the school context, the Student depicted in our speakers' narratives will not be sufficient for the task, and must instead "play" the character that world prescribes. In GBL narratives, then, we may expect the narrator to describe a different identity when speaking about normal classroom activities (the Student identity) as opposed to game-based learning activities (the Gamer). What projective identities emerge is a question for a later phase of the story. For now, the important point is that as the hero is separated from the traditional, expected program of the

classroom and sets forth on the GBL adventure, their initial identity will be challenged and a new identity will be assumed. Campbell is explicit about this shift: "by advancing beyond those bounds… the individual passes…. into a new zone of experience" (p. 82). As we know from Barab and Roth, a new experience signals a new awareness and therefore, a new life-world; since identities and life-worlds "cannot be theorized as independent entities" (2006), this new world co-emerges with a new identity for the speaker.

The separation itself has many characteristic features: there is a call to adventure, a challenge at the threshold to the other world, and the risk of refusing the opportunity for adventure. The "call" is not always articulated. While it sometimes is introduced by "a preliminary manifestation of the powers that are breaking into play … termed the 'herald'" (Campbell 1949, p. 51), the call can be an event or perception. "Typical of the circumstances of the call are the dark forest, the great tree, the babbling spring, and the loathly, underestimated appearance of the carrier of the power of destiny" (p. 51-52). The word "underestimated" stands out here, as many of the students I spoke with saw the game as something rather easy and informal, a "break" from the more difficult work they were normally asked to do. While the game held a great deal of scientific content, and while several students went on to credit it with clarifying their thinking about the nitrogen cycle, few described thinking of it as serious work at first. This is, of course, part of the goal of GBL – to design experiences that are immersive and engaging enough to background the exertion needed to learn whatever they are designed to teach.

The "call to adventure" that the NGame represents also is evident in the playfulness and intensity that students describe experiencing at the start of gameplay. My informants describe power struggles, vociferous debates about how to interpret the rules, and intense confusion over these rules as they began to play. These experiences are quite different from the typical activities in the classroom; they mark the "new zone of experience" Campbell refers to. Importantly, the "exercises of severance" (p. 10) that characterize GBL are much more extreme than the introductory activities that guide students into their standard classroom work. Passing out a sheet of paper or writing an assignment on the chalk board are the typical signals that a student must leave their daily life and engage in the adventure of learning. In game-based learning, students must learn new rules, encounter new sorts of artifacts (be it a game board or a computer interface), and heed the curious instruction from their teacher to "play" during class. Suddenly, we have a situation where students are not only called away from their personal lives to learn, they are called away from the context of learning to which they have become accustomed. It is worth noting that this particular effect will diminish if games rise to greater educational prominence and/or influence the pedagogies of non-game curricula. For the time being, however – and for the classes in question in my research – games constitute a radical break from standard classroom endeavors. As such, game-based learning stories are highly amenable to Campbell's model of narrative progression: they create the other, unknown world to which the hero is called at the start of the monomyth quest.

There is, of course, the possibility that the call to adventure will not be heeded (p. 59). Refusing the call is the great fear of educators everywhere – not just with regards to GBL, but to all learning interventions. What if students simply do not engage? In fact, serious games are one way that educators are trying to ensure students *do* heed the call. Too often, it seems that the industrial age paradigms of the deficit and transmission models of learning prompt students to abandon their learning adventures and turn away from meaningful action. As Barab and Roth (2006) puts it, when we remove the linkages between information and context, the content we teach "has the potential of being contextualized in terms of school relations" rather than "being … meaningfully [actualized in] particular affordance networks in the world." Luckily, Campbell notes that a refusal need not be permanent. In myth, supernatural aid often comes to the hero who has turned away from the threshold to the new world – as well as to assist the willing adventurer. "The sole problem is what the machinery of the miracle is to be" (Campbell 1949, p. 68). For educators, many hope that games might be one such miracle. We will need to examine the data to see whether or not the NGame's playful call is answered eagerly or not.

As we analyze student narratives for signs of the call to adventure and a crossing of the threshold from the real to the virtual world, I will focus on the following questions: How do students characterize the real world identity of the Student in their narratives of game-play and standard classroom activities? Do students describe themselves as heroes who accept the call or not? How do teachers and other students figure in the narratives – as opposing forces to be overcome, as supernatural guides, as

fellow adventurers? How do the other characters impact the student's depiction of their own identity at the outset of gameplay?

Once the narration turns to the game itself, once the hero has entered the virtual world and assumed the Gamer identity, the real fun begins – so to speak. Campbell refers to this middle section of the monomyth as the initiation along the road of trials (p. 97). This is where the hero must face perilous tasks as he makes his way toward whatever prize he seeks. The overarching theme of this stage is the tension and collapse of dualities. Referencing the primary mythologies upon which he builds his case, Campbell uses some highly gendered terms to describe this phase of the monomyth. I will relate, in brief, his arguments, but for my purposes here I would like to treat gender as a metaphor for identity itself. That is, what appear as discrete gender roles in the myths Campbell relates, may be understood as indicators of a discrete identity, an identity that can have an opposite or a virtual "other." The essential point remains the same: the hero must face her counterpart, perceive her separateness from this figure, and then see past dichotomy to a greater whole. The narrators in my study will be faced with the challenge of reconciling the Student with the Gamer and describing the projective whole beyond their distinction.

As Campbell tells the tale, the (masculine) hero may meet a temptress, a bride, or a Great Mother figure and so be forced to face his feminine opposite. To achieve his prize in the tale (and the tenor, enlightenment, for which any material gift is a vehicle), he must also see beyond the dichotomy. This may happen when a hero recognizes the "base" physicality of the temptress as divinity, when he weds his bride and therefore

becomes one with her, or when he fully conceives of the mother's power to both create and destroy. He may also meet a Father figure, a symbol which Campbell, drawing on Freud, cites as the perpetual antagonist in myth. The great deed of many heroes is therefore to slay the Father – and, most importantly, to become atoned with him. Again, a tension bred of difference (this time of power, not gender) is relieved by a symbolic action signifying union, "at-one-ment" (p. 130).

This is the pedagogical goal of game-based learning experiences: for students to see past the difference between themselves and the virtual character to the projective identity that emerges from their interaction. This projective identity – and the epistemic frame that goes along with it – are the holy grails of serious game design. Yet, it seems that identity work can be risky, especially work that requires the self-annihilation and "interval off nonentity" that Campbell describes as central to the hero's transformation (p. 35). In other words, in order to become someone new, an old self must die. Again we see the confluence of opposites, death and rebirth, an old identity seen through a new light, a new intentionality. What makes it possible for students to take these leaps? Here again is a point where GBL theory, narrative inquiry and Campbell agree: a safe space for experimentation. The phrase, popularized by psychologist Eric Erikson and used by Gee and McAdams is the psychosocial moratorium. This is a state in which a person "has made a provisional break from the past but has yet to pledge any allegiance to a particular future" (McAdams 1988, p. 16). In such a state, experimentation is king and risk is relative. Gee notes that inducing this state is one of the key ways in which games of all sorts open up a safe space for players to learn. He extrapolates that educational

systems should emulate this quality, creating more encouraging spaces free from immediate judgment. In the terms of myth, Campbell argues that "the dangerous crises of self-development are permitted to come to pass under the protecting eye of an experienced initiated" (p. 9). Often, this initiated figure is a wise elder or spirit guide, but there is no reason this guiding presence could not be embedded in the design of a game itself. In fact, that is exactly what most games are made to do, to lead a player through from start to finish, allowing her to be the agent in each scene yet shaping the paths she takes and keeping her safe from ultimate harm.

As students narrate their passage along the road of trials that is gameplay in the classroom, we might ask, How does the hero come to recognize the virtual identity he encounters as separate from his real world identity? That is, how does a narrator characterize the Student in relation to the Gamer? How, in narration, does he recruit these identities – in reference to his peers, his interests, his goals for the future? In what ways, if any, are the identities portrayed as "safe" from failure? And how, finally, does he begin to see the projective identity, Student *as* Gamer, emerge beyond the Student/Gamer dichotomy? These are the questions that attend the initiation phase of the monomyth.

What does this challenging initiation get our hero? What Campbell calls "The Ultimate Boon" (p. 172). In short, the boon is a state of "ever-expanding realization" (p. 190). This is essentially a way of describing an active, ongoing learning process. As noted earlier, many educational theorists present their models of learning as cycles (e.g. Dewey 1938, Kolb 1984), capturing the perpetual nature of this boon. Gee discusses this

idea under his "ongoing learning principle." Learning, for Gee, becomes a positive

feedback system, where each new understanding creates a need to acquire the next.

Gee offers us this explanation:

> The distinction between learner and master is vague since learners …
> must, at higher and higher levels, undo their routinized mastery to adapt
> to new or changed conditions. There are cycles of new learning,
> automatization, undoing automatization, and new, reorganized
> automatization (p. 68).

Similarly, Campbell reminds us,

> there must be … a continuous 'recurrence of birth' to nullify the
> unremitting recurrences of death. For it is by means of our own victories,
> if we are not regenerated, that the work of the Nemesis is wrought:
> doom breaks from the shell of our very virtue (p. 16).

Campbell renders in vivid prose the risk that Gee describes as the danger of committing

to a single form of routinized mastery. If our students ace the exam, but cannot put the

information to good use, have they really learned anything useful? Every piece of new

knowledge is just that: a piece. A piece in need of a puzzle, which itself needs solving

and which, upon completion, will reveal itself to be yet one more piece in a larger work.

The key word in pedagogical parlance for this problem is "transfer."

Issues of transfer abound in the educational literature, and GBL has come under

special scrutiny since many of the boons we hope our student-heroes will acquire while

playing are embedded within the game and difficult to measure. Many of the questions

raised in the literature focus on issues of conceptual transfer (can knowledge gained

during gameplay be used to solve new problems after the game is over?). For my

purposes, I am interested in whether or not students are likely to carry identities they

tried on during game-play back into the classroom and beyond. That is, did students adopt the epistemic frame (Shaffer 2005) we wished them to take on (in this case, the tendency to relate to biogeochemical cycles as complex systems and to treat representations of them as models rather than static facts)?

This is the question for the final phase of Campbell's monomyth: "the return and reintegration with society" (p. 36). With the great trials over and the prize won, this seems like an easy task, but it is not: Campbell refers to it as a "crisis" (p. 207). Many heroes refuse to return to share their knowledge with their original communities, preferring instead "the bliss of the deep abode" (p. 207). Some must be rescued from without; others must flee for their lives, having stolen something sacred. We will see evidence of each of these variations in the students' narratives. For now, let us consider what each means in terms of the classroom setting. The plotline in which a hero refuses to return is a dramatization of what critics of GBL most fear: the case where a student plays a game, and takes nothing meaningful away that can be applied to the professional world or topic under study. Now, many authors likely would argue that one always takes *something* away from a gameplay experience (see Gee 2007), and this brings us to the plotline of the magical flight. As we will see, many of my student informants felt as though they were "getting away with something" while they played. Play itself, and the pleasure it engenders, can seem like stolen treasure in classrooms typically associated with routine work.

At stake in students narrative work in this phase of the journey is the issue of coherence. Described beautifully by Linde (1993), the creation of coherence is one of

the primary tasks of a narrator who wishes to offer a "linguistically expressible history" that captures the "oneness or integrity of the self" (p. 101). As we have already seen, the "self" can be multiple and fluid over time; in game-play alone, there are easily three discernable identities to account for. And yet, as the hero returns from the virtual world where dualities collapse and all is one, where new knowledge is formed with the seed of its own undoing inside, she must find a way to make a coherent whole out of her experience if she is to be able to share that self and build new ones upon its foundation. She must link her past and present selves, and, importantly, decide with whom she will share this coherent self creation. Again, the hopes of instructors may not match the realities of student experience. We wish for students to emerge from gameplay with scientific mindsets, more ready to identify with scientific professionals. But, this may not be the case.

In narrative theories of identity, this issue of separateness and unity figure prominently; McAdams (1988) offers a particularly adept consideration of these issues. One of the prominent axes he describes as integral to identity formation through story is that of power/intimacy. McAdams describes these two poles as "superordinate content clusterings (thematic lines) in the texts of identities. … Men and women scoring high in intimacy motivation … are predicted to frame their identities in terms which emphasize close, warm, and communicative interaction with others. … Men and women high in power motivation, on the other hand, are predicted to couch identity in terms more agentic. Their life stories should emphasize having impact and feeling strong" (p. 91). With this summary, McAdams offers us a lens onto the struggle faced by the narrators

in my study as they return from the proverbial dark wood: with whom will the narrators align themselves, and against whom will they stand apart? These questions are crucial to our understanding of how the game-play experience in the classroom setting impacts the sort of epistemic frames students retain or life-worlds they inhabit after the GBL intervention is complete.

With all of these considerations in mind, we can pose the following questions to guide our analysis of the last phase of the hero's journey: What characterizes the projective identities students depict at the end of their GBL stories? What does the Student *as* Gamer look like, to them? Do students speak of their projective identities as integrated with their sense of self, or as characters that collapse once the game is done? Do the identities that students recruit at the end of their time with the NGame join any affinity groups or ostensible communities of practice, or do students depict them as more solitary and perhaps more powerful? These are the types of questions this model and the narrative inquiry methodology enable us to pursue as my participants' stories come to a close.

Methods

Foundations of Narrative Inquiry for Game-Based Learning

The reasons for the success of narrative in education research are many, but Clandinin and Connelly (2000) summarize the crux of the argument: "experience," they suggest, "happens narratively…. therefore, educational experience should be studied narratively" (p 19). Just as games and learning researchers take the game as both their

unit of study and their pedagogical method, narrative inquirers apprehend narrative as both the data under study and the research methodology itself. Both functions of narrative are crucial to incorporating student narratives into game-based learning research: by welcoming student voices into the formal literature, we affirm the centrality of the student in GBL practice, and by approaching their stories through a narrative lens we build a foundation for scaffolding games into educational spaces.

As a form of data, I conceptualize narratives in two broad ways: they are either narratives in the structural sense of a discourse unit exemplifying a grammatical or compositional formalism (e.g. Labov 1972) or in the analytical sense of any element of discourse explored through the lens of narrative frameworks (Tannen 2007, Ochs and Capps 2001). At the individual level, a structural narrative might be a story a student tells about how they successfully passed an exam, while the analytic narrative might be the logic, perspective, or attitude they hold. Even an explanation or description students provide might be conceived of in terms of the characters it implies or the untold narrative it initiates – these analytic tools could be used to investigate possible meanings such descriptions have for listeners and speakers alike. Both of these perspectives will be integral to my analysis, but I do not propose this split to be a clean dichotomy. Rather, I note it to remind both myself and the reader that the concept of a narrative is dynamic: before it is tied to any clear definition, narrative begins as a human experience in a living context.

As a methodology, narrative jauntily roams the fuzzy space between reductionist, mechanistic studies on the one hand and theoretical formalism on the

other (Clandinin and Connelly 2000). Where those approaches favor generalizability, narrative inquirers privilege the particulars of experience; instead of certainty, narrative inquirers say, "maybe…" – and mean it. Doing so, they attempt to revive a bevy of "complex issues, which are … considered significant by the participants in the research" (Webster and Mertova, 2007, p 3). Resisting the reductionist's urge to treat "experience [as] a black mark on the slate to be wiped clean" and the formalist's tendency to treat "experience [as] something to be ignored … the narrative inquirer does not prescribe general applications and uses but rather creates texts that, when well done, offer readers a place to imagine their own uses and applications"(p. 40-42). Understandably, terms such as "holistic," "inclusive," and "the whole story" are common in narrative research. While they are sometimes repeated to the verge of jargon, the mission is clear: to take human expressions of experience on their own terms first, and then in dialogue with our understanding of influential social structures and rational mechanisms.

The advantage of these perspectives on method and data for game-based learning research are profound. By staking our flag in the middle ground between reductionist and abstract certainties, narrative allows the GBL inquirer to return the focus back to the individual student (instead of generalizable design principles), return our attention to the context of gameplay (not just the contexts created within games), and begin to understand how students confront the issue of the identity dissonance inherent to "serious" gaming.

Participants and Context

Six participants volunteered to be interviewed. All attended State University, a land-grant institution in a mid-sized Midwestern city. Three participants were undergraduates enrolled in Introductory Biology, three were graduate students enrolled in Ecology. Participants were recruited by email after the conclusion of each course. In Introductory Biology, all students in the sections that played the NGame were sent an email requesting their participation in a research study; three responded. In Ecology, members of the Sustainable Agriculture cohort were invited specifically to include graduate students in the participant group.

Data Generation

I interviewed each participant once. Interviews lasted between 20 and 45 minutes, and followed a semi-structured format. I began each interview by explaining that I wished to understand their experience of the course in question, and asked them to begin by describing the course as a whole. Participants were then asked to zoom in, describing the nitrogen cycle unit as a whole and then the day on which they played the NGame. Interviews were audio recorded and transcribed.

I focused on retrospective narratives in order to understand the ways in which students characterize themselves throughout the trajectory of the learning activity. Hearing these stories from the perspective of students who have lived through the entire scholastic gaming adventure allowed me to examine my participants' identity work as the participants conceived of it in total. In another study, I would have

performed observations and ongoing interviews about my participant's progress during the course of the curriculum. This would have yielded a helpful data set for understanding identity in progress. In this study, my data offer the sum of that progress *as the students themselves made sense of it*. Taking this approach honors these students' agency in their own identity projects while informing our understanding of what students take away from serious gaming. Furthermore, listening to these stories offered me a way of understanding this small, wonderful journey of identity development as a bounded narrative. This bounding is of course artificial, but the powerful artifice is itself part of the work these students performed.

Data Coding

I coded the data following the guidance of Graue and Walsh (1998). I was particularly inspired by their description of

> *coding* as labeling themes that are represented by chunks of data. From this perspective, codes are merely the signifiers for ideas … More important than the code itself is the idea that the researcher is trying to communicate with that code. (p. 163, emphasis in original).

The idea that I was trying to communicate with my codes was the interplay between discernable identities in student narratives and the changes they undergo as the narratives progress. I was also hoping to convey emotions with these codes: the playfulness and excitement that come from story and games. These were the sentiments that buoyed me through the research process, and they are the sentiments that ignited the games and learning paradigm in education research.

Coding proceeded in two primary phases, external and internal (Graue and Walsh 1998, p. 163). I began by reading and rereading my transcripts, often listening along to the audio recordings to understand the connections between inflection and content. I first coded "chunks of data" that fit the descriptions in Table 1. for Gee's (2007) three gameplay identities and the three main stages of Campbell's (1949) monomyth. I memoed as I coded in order to capture the internal patterns emerging from my data. These were on a finer scale of classification than the external codes and represented the particular ways in which my participants characterized themselves and the particular tensions that animated each stage of their journey.

Data Analysis

I structured my analysis as a narrative following Campbell's (1949) hero's journey interlaced with in-depth inspections of the student, gamer, and scientist identities that appeared as characters in this story. As I trekked through this narrative alongside these characters, I drew on insights from the game-based learning and narrative inquiry literatures, threading these into the evolving story. In keeping with Clandinin and Connelly's (2000) conception of analysis as "a kind of conversation between theory and life or, at least, between theory and the stories of life contained in the inquiry" (p. 41), I invited the voices of other researchers into my analysis when their contributions will be most relevant.

Results and Discussion: Journey Into the NGame

Stories Outside the Box

On the desk in discussion room 318 rests a small, darkly colored box, waiting to be opened. Adorning the outside of this diminutive container are several logos, some signaling academic affiliations, others suggesting the pep of the entertainment industry. The box is simply made, but polished-looking. This is an item that could be found in a toy store, yet somehow its appearance suggests it would not. This was not built for mass production, yet it echoes the look of similar boxes that are. It is a game box, but it sits in an undergraduate biology classroom. And no one has yet arrived to lift the lid.

When they do, what will they find? When they take the game outside the box, who will they become?

These are the questions that prompted my research.

The literal answer to the first question is a game board, two decks of cards, a small circle of cardboard with the chemical symbol for oxygen, four plastic bags full of differently colored plastic tokens, a die, and an instruction packet The board features a series of symbols composed of numbers and letters which, connected by arrows, represent the nitrogen cycle. The cards bear vibrant, scientifically inspired images of microscopic organisms or ecological scenes. The cards with bacteria display the Latin name of each species. The cards with ecological scenes contain humorous flavor text. The dice look like dice.

Have a look for yourself:

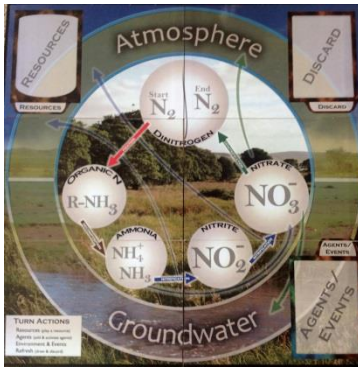**Figure 2.** The board of the NGame.

Figure 3. Selected cards from the NGame.

**Figure 4.** The dice from the NGame.

Is this a game? Is this a lesson? Yes and no, yes and no. As I have discussed, many in the games and learning community would say that this is a step up from the way the nitrogen cycle is traditionally taught – using an imaginative, hair-raising tangle that looks something like this:

Figure 5. Traditional text-book rendering of the nitrogen cycle (ag.arizona.edu)
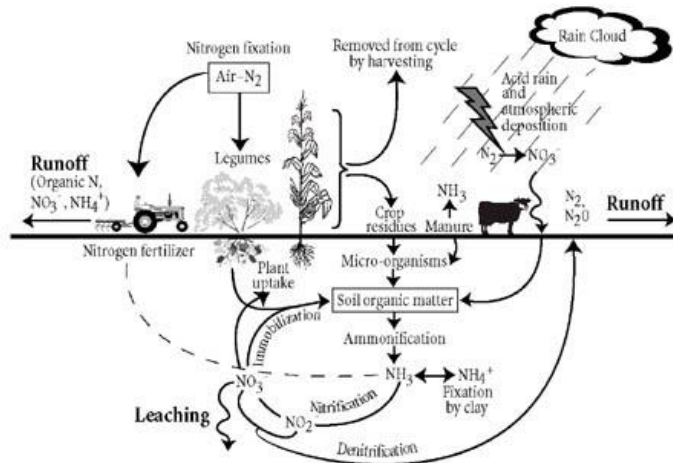
Unlike a static image on a page, this game was built to welcome students into the complexity, to allow them to enact it with their own movements. The NGame exhibits what is called "intrinsic integration" (Habgood 2005). That is, rather than offering play as a reward after a standard classroom exercise, the information educators hope students will learn is embedded in the mechanics of the game itself: you cannot play without leveraging bacteria, the bacteria's resources, and ecological events (all in the form of cards) to mimic the real chemical transformations that occur in nature (and are represented on the board, constituting the racetrack of gameplay). One of my participants summarized it simply: "It was a game, it was a real board game" (Lev's words).

And yet, something in Lev's insistence that it was a "real board game" belies his assertion. If the NGame is so clearly a game, why does he need to use this adjective, "real"? His next remarks offer some insight into this question: "I feel like people would sit down and play [the NGame] at home if it wasn't the nitrogen cycle." Ay, as Hamlet says, there's the rub. Science content and a classroom context shift this game into

liminal territory. Clearly a playable, enjoyable activity, the NGame remains enigmatic because it presents its players with complex biogeochemical information. Of course, the goal of my research journey has never been to decide whether the NGame is "really" a game or a lesson, as if it could be only one or the other. However, this tension drives the identity work I do wish to investigate. I want to know what it means to students to depart the world of education-as-usual, adventure into an activity that is meant to be both enlightening and fun, and return with new knowledge. I want to know what it means for their sense of self; more specifically, for the selves that they share in their own words. We now turn to the stories of six such NGame players to explore their sense of themselves as students, gamers, and ultimately scientists.

In The Beginning: Course Contexts

We are about to embark on a small but epic quest with six students. Any hero's journey begins at home, in the familiar tribal village of the every-day, so this is where we too will start. For my students, their academic home is State University, a large land-grant university in a mid-sized Midwestern city. At the time of the study, approximately 29,000 undergraduates and 19,700 graduate students were enrolled in the institution (State University Admissions Website 2013).

Three of those 29,000 undergraduates are Jessica, Diane, and Lev, who played the NGame in their Introductory Biology course. Intro Bio at State University is a high-enrollment, two semester sequence covering six content modules: animal physiology, plant physiology, ecology, cellular and molecular biology, genetics, and evolution. During each of these modules, students receive instruction in lecture, lab, and

discussion sections (participants' remarks, Introductory Biology 2007). Faculty traditionally teach the lectures, while teaching assistants lead lab and discussion. Jessica, Diane, and Lev would play the NGame in one of their discussion sections during the ecology module.

There was a general consensus among my participants that the course was very stressful. Intro Bio was very challenging for all three of them due to the wealth of content students were expected to absorb. Jessica bemoaned the fact that there was "just so much information! Like, it's very overwhelming." Echoing these sentiments, Diane expressed dissatisfaction with how quickly the course moved, remarking that the density of information "just fosters memorization." These sentiments run counter to the mission of the course, which is to initiate students into the scientific community of practice by instructing them not only in content, but skill- and mind sets as well (Course website 2007). The students' words highlight the difficulties and tradeoffs involved in these ambitious pursuits.

In addition to the abundant workload, another stressor students voiced was the lack of control they felt over their grades and experience of the course. Lev was often unsure what his professor was looking for in assignments:

> I don't know, it's just tough. Some of the concepts were a little bit trickier. [Professor Young] was asking for something in a question and you didn't really know what he wanted you to und[erstand]."

Diane emphasized this feeling even more strongly, stressing that there were "a lot of problems along the way that I didn't have a lot of control over" and that her fate in the course seemed to hinge on "random events" rather than the fact that she was

"incredibly interested" and "really plugged in." Putting it more bluntly, Jessica summed up this frustration in a dramatic revoicing of how she hears her professors: "sometimes, like, they say, 'Oh, oh, don't worry about your grade! Oh, don't worry about going into detail!' But you're like, 'Okay. You're *lying* to me." From frustration with expectations to a sense of outright deception, these students describe themselves existing in an almost adversarial relationship with the authority figures in their course.

This situation could not be more different than the setting from which my three other participants – graduate students Abby, Ashley, and Roxanne – set off into the world of the NGame. They played the game in an upper level Ecology course focused on grassland and prairie ecosystems in relationship to agriculture. The course enrolls approximately 50 students, a mix of undergraduates and grad students. There are no discussions or labs, just lecture led by two professors. All three of my participants from this course are master's students in the Sustainable Agriculture program at State University, a small program that admits approximately 10 students each year (Sustainable Agriculture Admissions website 2013). This program constituted a powerful affinity group (Gee 2007) in these students' lives. Importantly, they saw the professor as part of that group, so unlike Lev, Jessica and Diane, the graduate students did not spend much time expressing stress over the workload or course leadership. In fact, they described Ecology alternately as "very enlightening," "one of the best courses I've taken in graduate school," and "a popular class" sought out by all graduate students in the Sustainable Agriculture program.

An interesting feature of the Ecology course, one that never came up in my conversations with the undergraduates, was the layout of the classroom. With seats arranged stadium-style in multiple tiers leading down to the lecture podium, it was, as Roxanne put it, "a terrible room for board games." On the other hand, the dramatic stratification afforded space for interest-based niches to emerge. The niche these graduate students occupied was in the front row with others from their program; undergraduates from a student group on campus that advocates for sustainable agriculture populated the row behind them. As Abby put it,

> I loved this class, every day, I didn't really think of it as going to class as much as going and having a cool discussion with people and Matt because we sat right in the front and just talked to him most of the time.

Matt was the lead professor for the course, and all three graduate students were on a first name basis with him. This level of comfort with their instructor and the apparent atypicality of the class experience were hallmarks of each student's description of Ecology.

Also distinguishing this course from Intro Bio was the course structure. Where Intro Bio offered a highly structured syllabus, Ecology felt more spontaneous. Again, Abby's words are exemplary of the three students' sentiments:

> The lack of structure from the syllabus made it feel very informal because you never really knew what each class was going to bring. 'I think we were supposed to finish that book for today, maybe we'll talk about that. Or, we'll have a guest speaker with coyote pelts! I'm not sure…'

Abby assures me that there was, in fact, a guest speaker with coyote pelts. She also assures me that the seeming chaos of the course was not a drawback:

I still felt like I got a lot out of it, it was a good balance of presenting scientific information and then discussing it in the cultural and sociological context.

The sense I got from speaking with these students was that Ecology was, at least for them, a welcoming setting for intellectual curiosity.

My six participants began their game-based learning journeys in two very different contexts. As we will soon see, their respective experiences both reflected and transcended these initial starting points. Before the story can get underway, however, the heroes themselves must come into focus.

Meet the Heroes

The Undergraduates in Intro Bio

The undergraduates I spoke with were all around twenty years of age and pursuing biology-related careers. All are native English speakers; Lev and Diane are Caucasian, Jessica has Asian heritage.

Lev

Lev was a polite young man who answered my questions succinctly. He identified as a Bio Chem major who is "more on the animal side of things," with an interest in "pre-med or something like that, or research involving animals." His were the least emotionally charged comments about the course and game, and his general attitude was pragmatic. For instance, when I asked if he often completed the optional homework

assignments for discussion, he replied "Yeah, yeah I usually did it. Uhm, I luckily had a break, a one hour break, where I could usually fit that in to hopefully do as much as I could of it." His level tone suggested that his work was more a consequence of convenient scheduling than ardent commitment to the assignment's utility. I do not wish to give the impression that Lev was not studious; he came across as a serious student. Rather, I wish to convey the relaxed nature with which he discussed the course. Intro Bio was instrumental to him, a pre-requisite with some interesting information and the stress one expects in a pre-med curriculum. It was not the battle ground that the two other students described.

Diane

Diane portrayed herself as a very committed student, interested in learning as much as she could about biology. Participating in a neurobiology lab on campus as an undergraduate, Diane was already beginning to take on the epistemic frame (Shaffer 2005) of a research scientist. But, she still identified as a novice, noting several times that she wished there were more of a "safety net" and more "hand-holding" in Intro Bio. Highlighting again and again her intense interest in the subject matter, Diane struck me as the sort of student teachers dream of having: intelligent, articulate, hardworking, and eager to please. When asked about the game, she sometimes struggled to provide details about what she learned and routinely apologized – to me? to herself? to the gods of academia? – saying, "I probably did not master this to the level that I should have." The words "should" and "interested" capture Diane's motivations quite well: my

impression was that her desire to be a good student and her personal drive to learn were mutually sustaining impulses.

Jessica

Jessica's transcripts were highly enjoyable to read over, as her comments were often delivered in spirited prose. She figured herself alternately as a victim of deceitful teachers, a cynical elder looking back on "freshman [who] have so much hope and optimism," and an outsider because of her age ("I was a junior last year and I was taking all these classes with, like, freshman"). A psychology major after many attempts in other sciences, Jessica was resigned to doing whatever she needed to complete her degree: "things you gotta go through to get to certain places, right?" If I were writing a film noir instead of a master's thesis, Jessica would be my main character.

The Graduate Students in Ecology

Like the undergraduates, the graduate students represent a fairly typical group from this predominantly white Midwestern university. All three are white women and native English speakers, though Roxanne is also fluent in Spanish and uses this language in her research abroad.

All of the graduate students offered a great many thoughtful insights into the workings of the course, and offered them collegially. Professionalism and genuine interest were persistent features of these three women's reflections, replacing the defensiveness and complaints that often characterized the undergraduate's evaluations.

This difference may speak to the shift in power and responsibility that attends graduate school: more at ease with their intellectual authority as learners, the graduate students spoke from a place of greater confidence (whatever their anxieties about their own research).

These three students also presented a more unified front than the undergraduates, likely because they are all in the same cohort of Sustainable Agriculture and are friendly within that group. The undergraduates in Intro Bio that I spoke with did not know each other; here, we meet a group of women in their late twenties and early thirties that have self-selected into the same, specific master's program. They are, of course, still very much their own people.

Ashley

Ashley has a long history of interest in environmental and sustainability related topics from undergraduate and previous work experience. She frequently emphasized her identity as a graduate student – whether it was to register embarrassment that she struggled to learn the NGame when "high schoolers play it" or to affectionately describe her cohort of Sustainable Agriculture students in Ecology as "the nerdy grad students in the front [who] had to hold ourselves back from answering every question." Her conversation was straight forward and engaged. Like the other graduate students, she emphasized her desire to learn.

Abby

Abby brought a genial, thoughtful, and gentle personality to the interview space. With a biology background and interest in education, she spoke of the NGame from the perspective of both student and potential instructor. "I like teaching," she shared, "… I like to think about pedagogical methods and reflect on different ways of teaching and how effective they were." Like the other two women, she identified strongly with the Sustainable Agriculture group. She referenced this group to distinguish herself from a group of students in the class who came from a more traditional agronomic background. My conversation with Abby followed a pleasant, contemplative path as she related her experiences and tended to focus on the positive elements of each.

Roxanne

The most animated speaker of the three graduate students, Roxanne talked about Ecology the way people relate exciting events to friends at dinner parties. Even teaching statistics became an engrossing story: "The standard normal distribution is like the Platonic *Ideal*! Let's talk about Plato for a second…." With a background in the humanities, Roxanne did not figure herself as a scientist. While interested in ecology for her own curiosity and as a reference for future work, she came into this class identifying as an outsider of sorts:

> I also had a different approach to it than the typical student in the class because I needed to take that distribution requirement for Sustainable Agriculture. Everyone in Sustainable Agriculture takes it because it's a great course. That's why I was taking it, not necessarily because I need to know about grasslands for my thesis or because I need to know about ecology for my resear- for other things, so I was going into it like, 'I want to have a learning adventure!'

And with that declaration, let us begin our own adventure into the identity work of these six formidable narrators.

The Hero as The Student: Who Sets Out on the NGame Adventure?

We have now seen a brief picture of who our narrators are as individuals, and how they interacted with me as an interviewer and colleague. As we begin to inspect the identity work they perform in their narratives, it is time to ask how they depicted themselves as characters in the story of their classroom experience. Campbell reminds us that the hero, before she begins her archetypal quest, is preoccupied by the "civic and tribal routines" (p. 23) of daily life. These routines are the context of her initial identity work, the work that Gee (2000) explains makes her "[recognizable] as a certain 'kind of person' in a given context" (p. 99). The context I am interested in is the classroom, and the kind of person, the student. Before the game appears, what attributes make one student recognizable to another *as a student*? Answering this question will help us understand one of the real-world identities most strongly evoked from my participants by the classroom context.

Recall that Gee describes this real-world identity as the self a player brings to the game (2007), and notes that "all people have multiple identities connected … to their performances in society" (Gee 2000, p. 99). Importantly, this perspective does not attempt to access the "core identity" of a person, but rather his or her *performances*. While each individual performance is unique, similarities emerge that make each performer recognizable as a member of a larger group. Barab and Roth (2006) echo this

idea when they describes the "family resemblances across individuals" that exist despite the intimately individual nature of a person's life world. This concept is particularly useful in a narrative inquiry, as it allows us to honor each speaker's voice while seeking trends across the identities they perform as students in academic society.

When listening for the identity work my speakers perform to characterize themselves as recognizable students, I attended to four specific facets of identity suggested by Gee (2000). These aspects of identity are the building blocks that will be useful for understanding each of the three identities a gamer takes on (player, character, and player *as* character; or, in this study, student, gamer, and student *as* gamer). The "four ways to view identity" (p. 100) are Nature-identity (N-identity), Institution-identity (I-identity), Discourse-identity (D-identity), and Affinity-identity (A-identity). Each will be discussed in turn below as we explore the ways in which my speakers narrate their sense of self as Students.

The most intuitive of the identity categories is perhaps the Nature-identity, the sense of self we have because of traits we were born with, or, I will add, which we consider to be inborn. Interestingly, none of my participants invoked their gender, ethnicity or other standard N-identities of interest to educational scholars. What my participants did describe with great frequency were their personal learning styles: differences in ways of processing information, working, and thinking, which my speakers alluded to as innate characteristics. Lev summarizes this trend in response to a question about the helpfulness of having lab and discussion content align perfectly with lecture:

> It obviously depends on the individual, but for me, if I didn't understand something it'd be nice to go over it in discussion. And, even if I did, it's nice to solidify it.

The qualifier "for me" suggests that the effectiveness of course practices will vary from student to student. This is an assumption that pervades my participants' stories. Compare Jessica's remarks when I asked her to describe the different components of Intro Bio:

> There was lecture, discussion, and then lab. Uhm, I felt like discussion didn't really help me out, like, at all. Because I'm more of a person who studies by myself.

The phrase "I'm more of a person who" accomplishes the same identity work as Lev's phrase "for me." In both cases, the narrator establishes his or her individual identity while simultaneously developing the character of the Student as someone with learning preferences unique unto themselves. Lev's use of the word "obviously" underscores the universality ascribed to this characteristic of the Student.

Showing up again and again in the narrators' stories of normal class experience, the trait of learner individuality performed several key functions. First, it sometimes served to acknowledge what the speaker perceived as a socially recognizable deficiency by comparing her (poor) performance to the more competent achievements of her peers. Appealing to an apparently inherent trait may be a way of shifting responsibility for shortcomings away from the speaker. Johnson (2008) noted similar work in the narratives of pre-service teachers seeking to justify themselves as agents while describing struggles to access resources for literacy learning.

Such a move can also restore a speaker's authority as a narrator, which might have been compromised by the apparent failures he related. This is a common strategy for maintaining one's inclusion in a certain group by "recognizing [a narrative shortcoming] as problematic – as a less than desirable way of presenting a life story" (Linde 1993, p. 158-159). This acknowledgement assures the listener that the speaker is aware of commonly held standards and wishes to abide by them; it also distances the speaker from the self they narrate. Jessica was the most profuse in this regard. When describing her frustration with Intro Bio's term paper, for instance, she spoke as follows:

> Oh, gosh, like, you don't have time to actually work on it 'til, like, a month before, unless you're like doing work all the time, which, I mean, *I* don't do, I mean, some other people do! *<laughter>* So, I guess it depends on the student, but it's just a lot of work.

Jessica repeated this rhetorical move (distinguishing herself from others) so often that by the end of the interview she remarked to me, "I need to stop comparing myself to other people! *<laughter>*." Jessica had taken the apologetic act of comparison so far that she felt the need to apologize for the strategy itself!

It is not surprising that my participants would want to reassure me of their dedication to academic ideals. They were each aware that I was a graduate student as well as a teaching assistant. For the undergraduates, while I was not their particular TA, I represented someone who held certain expectations of biology students. For the graduate students, I represented a peer who was attempting to master similar skills and knowledge. In both cases, there was implicit social pressure for them to confirm that they were aware of the expectations they (and, for the graduate students, myself) were

expected to meet It is likely, therefore, that the preponderance of remarks about the differences among students was, in part, meant simply as an apology for each speaker's perceived inadequacy.

Guilt is not sufficient to explain every instance in which my participants described themselves as the Student by invoking individuality in learning styles. Linde (1993) offers another persuasive explanation in the form of the coherence system. This term describes a "system that claims to provide a means for understanding, evaluating, and constructing accounts of experience" (p. 164). A more specific type of logic than common sense, a coherence system "is specifically a semi-expert system, related but not equivalent to either belief systems shared by an entire culture or belief systems that are properly held only by some class of experts" (p. 165). This is the beauty of a coherence system: it provides, in terms accessible to narrators "with no corresponding expertise or credentials" (p. 163), a rationale for experience that carries the weight of specialized knowledge.

For my students, the coherence system they leverage to perform their N-identity work is that of learning styles, a theoretical concept with a rich and active literature in educational research. The term enjoys a great many different conceptualizations, which constitute "a wide variety of ways to describe differences in the way that people learn" (Richardson 2011). Generally considered to be stable, individual traits, learning styles in various guises have received mixed empirical support (e.g. Dunn et al. 1995, Reynolds 1997). However, the idea that different learning styles are intrinsic characteristics of students, and that these styles are recognized by formal research, may help explain

some of the earlier comments by Lev and Jessica. Invoking a more specific vocabulary in the learning styles coherence system, both Roxanne and Abby independently described themselves as "very visual." The breakdown of learning styles by preferred modality has received a great deal of popular attention (e.g. the VARK exam, vark-learn.com). Whatever specific model they invoke, however, the speakers all ascribe variation in learning styles to themselves as Students. Clearly, inborn strengths and preferences for learning strategies are part of what make someone in State University recognizable as a Student.

While my speakers had a strong sense of themselves as learners with particular preferences, perhaps the most important parts of their identity as Students were the constraints placed upon them by the academic institution. Narrating instances in which their courses succeeded or failed to meet their learning needs or explaining their relationships with teachers and advisors, my participants were describing what Gee would call their Institutional-identities. Having an I-identity is arguably the defining identity of the Student, since this "kind of person" does not exist without the context of school or academia as an institution. When explaining I-identity, Gee (2000) uses the example of himself as a professor: academia, for him, becomes the prototypical institution that creates recognizable individuals. He conceives of this identity as "a position authorized by authorities within institutions" (p. 100, Table 1).

For the undergraduates I interviewed, their sense of I-identity was characterized by embattlement. While faculty and TAs were sometimes described as "very organized… very helpful…" (Jessica), the fact that these authorities held Lev, Jessica, and Diane's

grades in their hands created a tension that suffused the interviews. At times, the

stories took on an almost mythic quality; the students really did seem to become heroes

in their own tempestuous battles for academic validation. Two examples will paint the

picture vividly. The first is Diane's account of a frustrating episode in which her lab TA

graded Diane and her peers harshly after receiving feedback from the course

coordinator. She delivered this account in a hushed voice as if imparting some

clandestine tale. The "you" in the first sentence refers to a figurative TA.

> I have heard rumors that there's, like, a sit down with Olivia White [a
> course coordinator], or, like, you kind of hear, you know, where you are
> in terms of grading and stuff like that – but I don't know. I know that
> basically, after – I don't know, I think after that meeting our TA gave us,
> like, everybody in the class C's on something. 'Cause, like, he found out
> that he was an easy grader and then he kind of just, like, gave, you know,
> just, like, overcompensated.

In this story, we get the sense that there are several layers of authority separating a

student's performance from her grade. With one reprimand from the coordinator,

Diane's TA delivered a volley of poor marks to the students in Diane's lab. Stories like

this exemplify the lack of control over one's own fate that seems to typify the

undergraduate Student identity. Jessica makes this point even more vehemently as she

describes the way she believes her professors think about education. She related this

brief narrative with indignant confidence.

> *Jessica*: I liked when the professors were very organized. Sometimes they
> weren't, uhm, sometimes, like, they say, 'Oh, oh don't worry about your
> grade! Oh don't worry about going into detail!" But you're like, 'Okay…
> you're *lying* to me.'
> *Julie*: Why would you say that?

> *Jessica*: Because you kind of have to go into details to learn something. …
> I feel like if I learn one little detail, if that detail doesn't get connected the whole thing doesn't make sense. Yeah, so then, when they tell me, 'Oh, you don't have to go in depth and learn the little details,' I'm like, 'Ahahaha! You're lying.'

Jessica here figures her professors as both ignorant of her true learning needs and outright deceptive (if, perhaps, unintentionally so). This story, next to Diane's, illuminates the undergraduates' I-identity as one of submission to none-too-benevolent authorities who are capable of supporting or subverting students' achievements. This is a very precarious identity to inhabit.

The I-identities the graduate students related were far less oppositional toward classroom authorities. Part of this may come from the fact that all three were familiar with Matt from other seminars, and were on a conversational, first-name basis with him. Still, the institutional constraints they described as shaping their identities as Students, while frustrating at times, were more benign than those the undergraduates portrayed. Program requirements and the will of advisors were two key factors that frequently appeared in their narratives. When asked why she enrolled in Ecology, Roxanne responded that she was interested in the topic and "needed to take that distribution requirement for Sustainable Agriculture." Ashley expressed similar interest and explained that "it satisfied my ecology requirement, but it was, like, a class that my advisor let me take because it didn't have too much to do with my research." These speakers, then, recognize each other as Students because they are subject to the same program requirements and advisor verdicts. The important distinction between the undergraduates and graduate students seems to be what Gee (2000) describes as "a

continuum … of how actively or passively the occupant of a position fills or fulfills his or her role or duties" (p. 103). He explains that some people may see their I-identity as a "calling" while others (the example he gives are prisoners) feel it was "imposed on them" (p. 103). While all six of my participants elected to enroll in college, there is a much clearer sense of active participation by the graduate students; the undergraduates see themselves as being at the mercy of a higher, imposing power.

Both categories of student, however, performed identity work to endow themselves with agency despite the constraints of the academic institution. One of the most prominent ways this took place was by rhetorically aligning themselves with fellow students. Tannen (1989) calls this strategy "choral dialogue." This type of identity work falls under Gee's category of Discourse-identity, the aspect of identity that exists through "the discourse of 'rational' individuals" (p. 100, Table 1). To claim an identity in this view, the speaker must co-create it with their peers. My participants often spoke in first person plural, using a collective "we" to align themselves with a larger group of students. This is one of the most subtly aggressive forms of identity work, as it grammatically insists that the narrator belongs to the group of people for whom he speaks. This belonging implies the recognizability on which Gee places such a high premium. A succinctly powerful example appears when Ashley describes her position in the Ecology classroom: "we sat in the front row, we were, like, the nerdy grad students." By simply describing herself as part of a group, she establishes her identity both in terms of its characteristics (someone "nerdy" who sits close to the teacher) and its social validity. Notice how much differently her statement reads in the first person: I sat in the

front row, I was, like, the nerdy grad student. There is a sense of isolation, of vulnerability in this rendering that evaporates with the appearance of the plural pronoun. Speaking as "we" gives students the chance to assert their own identity as a certain "kind of person" by populating their social context with other people of this "kind" who would recognize the speaker as one of their own.

Johnson (2008) suggests that choral dialogue also affords speakers an evaluative distance from their experience. This distance allows narrators to make judgments about their experience that are implicitly corroborated by the others for whom they speak. An uplifting example in my data is Roxanne's description of two class discussions that occurred late in the semester. "Those were two of the best classes I've ever had in grad school," Roxanne begins, offering her solitary opinion at first. Then she continues, "we all walked away being like, '*That* was a *great* discussion! *Really* great!'" Employing an emphatic tone and revoicing sentiments shared by her fellow classmates, Roxanne adds weight to her personal evaluation. Simultaneously, she builds her identity as someone who values discourse and has the authority to judge its merit. Many of my participants used this discursive strategy to indicate the validity of the identities they were narratively constructing.

Gee's (2000) final view on identity, the Affinity-identity, is suggested by the in-grouping students performed in the previous examples. A-identities are those which come into being through participation in affinity groups, groups of shared interest and practice. Given the academic context, my participants' A-identities as Students are related to the I-identities they described. For the graduate students, their program

constitutes the most prominent affinity group to which they belong. As is evidenced by Ashley's remarks about sitting together in the front row and Roxanne's recruitment of her fellow Sustainable Agriculture students' approval of class discussion, my graduate participants had opted-in to a desirable affinity group by applying to this program in State University. Abby further exemplifies this identity work when she narrates a discussion in Ecology regarding a modelling program used to experiment with different land use practices on an imaginary plot of Iowa farmland.

> We had a lot of kids in our class – not kids, undergrads in our class who are from the more agronomic background and a lot of us from the Sustainable Agriculture, or there's a big group of Sustainable Agriculture Student Group people in our – but, then, hearing some of the logic and the policy stuff behind their decisions that none of us know was really interesting. 'Well, you wouldn't do that, clearly, because you wouldn't have the equipment to do both this and that on the same farm.' Oh, right! You do need different machines!

Abby first distinguishes her fellow graduate students from the (oops!) "kids" in the class. She goes on to distinguish a more specific "us" (the graduate students and undergraduates in the Sustainable Agriculture Student Group) from "them" (the students from a "more agronomic background"). Even while she finds "their" insights valuable, she emphatically locates her own identity within the affinity group interested in a certain set of agricultural practices and beliefs.

With the undergraduates, the primary affinity groups relevant to their Student identity were academic majors and disciplinary interests. Lev is a "Bio Chem major," which explains his enrollment in Intro Bio: "I need it for my major. Obviously I need, uh, biology." While this statement reflects Lev's I-identity as a student constrained by the

curricular requisites of State University, it also signals his membership in the affinity group interested in biological affairs. He later specifies this interest somewhat, explaining that he does not plan to continue studying ecology because "I think I'm more on the animal side of things." By animal, he is referring to the physiology portion of Intro Bio, which fell under the name "animal physiology." By studying Intro Bio and pursuing a degree in Bio Chem, Lev is mastering the practices and thought patterns required for full participation in the affinity group that concerns itself with "the animal side of things."

Notably, the academic affinity groups of the undergraduates are far more preliminary in nature than those of the Sustainable Agriculture students. Diane explains that taking Intro Bio was valuable because its broad scope allowed her to explore several possible affinity groups she might like to one day join:

> I think, I think, yeah, it was good to get sort of an overview of everything because I remember especially during the plant physiology unit I was kind of, like, 'Wow, I really like this,' you know? And it was something that I'd never even considered. … And animal physiology, of course, was helpful for med school. And it's like, do I actually like this? Or, or, you know, do I just want to go to med school for a million other reasons? … I think each unit was kind of a way to self-examine and make sure – you know, if you're a bio major, I think it is good to sort of think about, 'am I in the right area of biology, am I focusing on the right things?'

Unlike the graduate students, whose A-identity work was focused on bolstering and leveraging their pre-selected affinity group, the undergraduates are in an exploratory phase. Moreover, there is a sense in Diane's words that a great deal hangs in the balance. While Diane insisted that it wasn't "like I spent hours thinking about it or not like I laid in bed thinking about what I was gonna do with the rest of my life," the fact

that she felt the need to clarify this suggests that these choices do, indeed, demand

great care and attention. Jessica gives voice to the anxiety of this process, explaining

her own journey to find the major that offered a viable A-identity for her:

> I've always been undecided until, like, I was like, "Oh gosh! I should probably [choose] something. Yeah, so, uhm, I picked psychology finally because that was the only thing – like, the *only* thing – that worked, for, like, me. Yeah, like, I wanted to be an art major, and I was like, 'I can't do art all the time!" And I was gonna be a soc[iology] major and I was like, "…no." And I was gonna be an anthro[pology] major, nope. I was gonna be a bio[logy] major, like, nope.

Jessica had to try on a laundry list of academic disciplines before she found the major

whose attitudes and practices supported her sense of herself as a Student. The A-

identity experience of Lev, Jessica, and Diane was much more turbulent than the steady,

supportive affinity group to which Abby, Ashley, and Roxanne belonged.

To summarize, when we meet the six heroes about to being their adventure, we

meet a group of individuals who are Students by virtue of their individual learning

preferences, dependence on institutional authorities, avowed or developing

commitment to a given intellectual affinity group, and sense of membership in a

collective whole. The focal adventure of this thesis, playing the NGame, problematizes

many of the standard identity traits prescribed by typical conceptions of academia:

reliance on authority figures for information, the passive transmission of information

from speaker/writer to listener/reader, the deficit model of education. Suddenly, my

participants were faced with a new set of rules to learn, and an activity without a

traditional roadmap towards a learning outcome. How will they describe the arrival of

this strange educational artefact – a board game – and their entrance into a new arena for identity work?

Separation: The NGame Adventure Begins

Campbell (1949) tells us that the call to adventure, and the separation from the everyday world of the known, constitutes "a dying to the world" (p. 35) and "the awakening of the self" (p. 51). We have already seen that, prior to the NGame even appearing on the scene, the young men and women with whom I spoke performed an impressive amount of work to awaken their Student selves. As the familiar activities of the classroom "die" back, what new self will awaken? That will be the topic of the next section. For now, let us examine how my participants narrate the beginning of their adventure.

For the undergraduates, the separation is abrupt. From Jessica:

> I, like, went to class, I went to discussion and I was like, "Oh… we're playing a game." … I was like, "oh my gosh, it's like Pokemon or something!

She assumed that the game was added to the curriculum to test its effectiveness:

> Didn't, like, people at the university just make it, and they were like, 'oh, we're gonna put this at students and see how they like it?'

From Diane:

> They just kind of threw the game at us and were like, "Go!"

The phrases "oh," "oh my gosh," "put this at students," and "Go!" signal an abrupt "[exercise] of severance" (Campbell 1949, p. 10) from the everyday atmosphere of the classroom. The speakers' sense of surprise is evident. Their accounts are consistent with Campbell's description of a sharp break from the known world, as well as the I-identities of the undergraduates who often see their instructors as untrustworthy, not to be relied on in moments of crisis. While this sense of shock may not seem ideal from the perspective of teachers who wish their students to be prepared for class, it can have great educational value. Researchers studying interest development suggest that surprise is often the first step in cultivating a new interest (Hidi and Renninger 2006), which might then allow students access to new affinity groups. Campbell also notes that a sense of surprise or "blunder" (p. 10) is frequently what shifts a hero's "center of gravity from within the pale of his society to a zone unknown" (p. 58).

The game certainly represents a different "zone of experience" (p. 10) than previous discussion activities. Diane narrates a humorous comparison:

> I liked the discussions and I don't have suggestions as far as making them better, but it was very much like *<Diane's voice changes here, lowering dramatically in pitch> worksheets*. Like, you come in having done a worksheet, then you do a worksheet during discussion, and they grade it.

This play by play of the standard discussion experience stands in stark contrast to her depiction of the start of gameplay:

> We were all sort of scrambling to learn [the NGame] at the beginning… just like, the initial period where we were kind of like, uhm, yeah, 'cause they just kind of threw the game at us and were like, "Go!" Yeah! *<laughter>*

The action verbs "scrambling" and "threw" and Diane's laughter highlight how distinct an experience the start of gameplay was from the worksheet parade to which Diane and her peers were accustomed.

And yet, this new arena is not entirely alien. Campbell reminds us that the start of the hero's journey toward enlightenment is marked by something "familiar to the unconscious, though unknown to the conscious personality" (p. 55). Roxanne allowed this unconscious familiarity to guide her into the liminal realm of classroom gameplay:

> We'd never learned the nitrogen cycle before, but we've learned games before. So, it's much easier for you to learn something that you know how to do – so we focused on learning the game, rather than learning the nitrogen cycle.

If "the passage of the threshold is a form of self-annihilation" (Campbell 1949, p. 91), then Roxanne has (at least temporarily) annihilated her Student identity in order to dive into the experience of the NGame.

For some, however, the familiarity of the game contributed to their tendency to question the NGame as a learning tool. The call to adventure is often heralded by the "underestimated appearance of the carrier of the power of destiny" (p. 52). While Roxanne may have underestimated the NGame in the beginning, she was willing to engage with it on its own terms. For others, approaching the herald with skepticism meant almost refusing the call to adventure. We hear such skepticism in Jessica's "oh gosh, it's like Pokemon or something!" Jessica nearly does turn back from the threshold of the hero's journey, her analogies to other games fostering her resistance:

> It was kind of like Candy Land, which I used to love that game when I was a kid, but now I don't. I can't even sit through that.

Caught up in the evolving A-identities of college, Jessica seems to be moving away from the self that enjoyed a child's game. As we will see later, she did become engaged enough in the game to generate some meaningful questions. Jessica avoids becoming "[w]alled in boredom" and "[losing] the power of significant affirmative action" (p. 59), the fate Campbell attributes to those who refuse the call to adventure.

Ashley did not seem to be so lucky. While the students in Ecology apparently received a more detailed introduction to the nitrogen cycle before playing the NGame than did the undergraduates, Ashley still entered the world of the game unsure of its content. More importantly, the game mechanics proved to be the "threshold guardian" that blocked Ashley's entry into the adventure of the game:

> I was really frustrated because I feel like we were a bunch of grad students, we couldn't figure out the rules, like I think each team had a different understanding of what the rules were and we weren't gonna be like, oh, you can't do – there was just, like, too much going on. But there were maybe a couple people in the group that really wanted to win and I didn't really care. … I think I just zoned out.

The affinity group Ashley had relied on to support her Student identity proves insufficient in this context – despite being "a bunch of grad students," Ashley's group could not come to a satisfying consensus on how to play the game. Even the discursive move of implicating her peers in her confusion does not seem to offer much stability to

her Student identity here. Likewise, we can hear Ashley's I-identity attempting to exert itself in her appeal to an external authority, the rules. Her classmates were willing to let go of these identities and become Gamers able to cross the threshold into the world of the NGame. Insisting on her N-identity learning styles, Ashley refused to cross this boundary and learn in a different way:

> I think that going into it, I still, like, wanted to learn. It's like I probably just needed to go home and, like, flashcards and, like, nitrogen cycle stuff and I think that's how maybe it really gets into my head … I think I was looking for, like, 'this is how we would learn by this game,' you know?

Campbell, in his ever-thrilling prose, suggests that "[a]nyone unable to understand a god sees it as a devil and is thus defended from the approach" (p. 92). Perhaps Ashley did not see the god of learning within the NGame, and so "zoned out," avoiding the devil she thought she had encountered. What identity work did her fellow graduate students undertake that allowed them to cross the threshold? How did the undergraduates adjust their sense of self to engage with the NGame? To answer these questions, we must get to know the virtual role that the NGame implicitly asked these students to take on: The Gamer.

The Gamer: Hero on the Road of Trials

In 2003, Pivec *et al.* declared, "[w]e have to invent radically new ways of learning." Games designed for educational purposes have been a leading answer to that call. As Garris et al. (2002) put it, "[t]here has been a major shift in the field of learning from a traditional, didactic model of instruction to a learner-centered model that

emphasizes a more active learner role." With this "major shift" and a "radically new" mode of instruction, we should expect or heroes' I-identities as Students to run counter to their I-identities as Gamers. The "traditional, didactic model of instruction" encourages students to assume the role of passive recipients of knowledge validated by the academic institution. The gaming industry, on the other hand, abhors a passive receiver. One of the first requirements for gaming is that one plays; the medium requires engagement.

Most of my participants easily set aside the suite of practices that allowed them to enact the I-identity of the Student. Diane, for instance, recalled that she "didn't take notes on the game or anything." She said this as though it was a given; *of course* she didn't take notes on the game. In a classroom that normally enforced note-taking in the form of Diane's infamous "worksheets," the game effectively shifted Diane's "center of gravity" away from her previous impulses. Instead, Diane and most of the other participants assumed attitudes and practices that would identify them as Gamers. Most notably, "competition" – a prime indicator of active engagement – came up in every interview without my prompting. Roxanne put it most exuberantly, her voice ringing with excitement as she told me about playing the NGame:

> I was just trying to win. I was just like, I don't – 'what card will get us farther down the board, it's not – ok, it's that one!' I'm a very competitive person, and I think Abby was playing the game with me and we wanted to *win*, it was about *winning!*

As she spoke, revoicing her thoughts from gameplay, she seemed transported back to the moment. There was no question, listening to her, that she was a Gamer. The drive

to win, to do anything to "get… farther down the board" is exactly the behavior that makes someone recognizable as a Gamer. When I asked her where that drive came from, she responded, "Oh, it's a game. It's just a game. I want to win the game." The NGame created a context in which Roxanne felt fully comfortable becoming a Gamer.

Jessica was the only one of my participants to truly question the validity of the NGame as a game; her concerns display a concerted I-identity perspective of herself as a Gamer. Jessica's question was, "was it a published game? 'Cause, like, didn't like, people in the university just make it?" Having already compared the NGame to two published games (Pokemon and Candyland), Jessica seemed to be looking for something more than board game morphology to convince her that the artefact in front of her counted as a real game. If it came from "people in the university," the game lost some of its game-ness. As a result, Jessica was reluctant to fully assume the role of Gamer. Lev disagreed. "It was a game, it was a real board game. I feel like people would sit down and play that at home," he explained. That is, "if it wasn't the nitrogen cycle." Like Jessica, Lev felt that the ecological content somehow contaminated the activity, making it less game-like. For Lev, though, this did not obstruct his Gamer identity. He kept track of who was winning during the game and told me with a smile that his team enjoyed a laugh as they found "certain cards where you could destroy your players' nitrogen, send it into the atmosphere." Lev had noted the NGame's liminal quality, somewhere between game and lesson, but he enacted a recognizably Gamer self.

Lev's ability to narrate a Gamer identity that supersedes the academic I-identity at work in the classroom depended on his fellow players. When we were talking about the laughter around nitrogen-destroying cards, I said:

> *Julie*: So there was a humorous component to [the game]? Or a social component to it?
> *Lev*: Yeah! Yeah, definitely a social component to it.

The affinity groups that so many of my participants recruited to establish their identities as Students had shifted. Academic allegiances no longer mattered: one's commitment to play did. As we saw previously, Ashley clung to the "bunch of grad students" and found them unable to furnish her with an adequate understanding of the NGame's rules. I wonder what would have happened if she related to these same people as fellow players instead of graduate students. This approach seemed to work for others: when I asked Lev if he had any difficulty learning the rules, he replied that it "wasn't too bad, you learned as you went." This more laid-back perspective on gameplay allowed Lev to truly play, rather than worrying if he were playing correctly.

This orientation also seemed to work for Roxanne as she grounded her Gamer identity, in part, in an affinity group that included Abby. These two women formed a team that "wanted to *win*, it was about *winning*." Abby echoed this sentiment, talking about how much her fellow players wanted "to beat each other … that may have just been us, a bunch of type A competitive people come to play a game." By affiliating with a group of people with shared attitudes toward gaming, Abby and Roxanne were quickly

able to mutually validate their identities as Gamers. Declining to relate to her peers in this way, Ashley "just zoned out."

Identifying as a "type A" person also reflects D-identity work. When describing Discourse-identity work, Gee (2000) uses the example of a charismatic friend: "the 'power' that determines [the trait of charisma] or to which my friend is 'subject' is the discourse or dialogue of other people. It is only because other people treat, talk about, and interact with my friend as a charismatic person that she is one" (p. 103). Similarly, "type A, competitive" people will lose that identity bid if no one responds to them as competitive people. This is an important aspect of the identity work conducted during gameplay; in large part, the ability of each student to assume the Gamer identity depends on whether or not their peers also assume it. Now, not all gamers need to be "type A" or hyper-competitive, but for someone seated at a game board to sustain a Gamer identity, her fellow players must at least act like players themselves and respond to her as a player. For Roxanne and Abby, this support existed, and so both women flourished as in-class gamers.

There was not a great deal of N-identity work that my participants performed to reinforce themselves as Gamers (unless we assume that Abby viewed being a competitive person as an innate trait, which she does seem to imply). This may be because there were no avatars with which to identify (for instance, a woman playing a masculine avatar might have remarked more on the impact her gender had on her role as a Gamer). Alternatively, this could reflect the hope held by many game-based learning researchers, that games have the power to transcend boundaries established

by gender, race, and other N-identities that often seem to menace curricular equity. Some specifically mention closing the achievement gap in STEM fields as a goal of serious game development (Mayo 2009). Regardless, the primary N-identity work I did hear my participants engage in was with reference to the innate learning styles they had posited earlier. In fact, this was the first link I saw emerge between the Gamer and Student identities my players enacted. Just as being "very visual" characterized Abby in the classroom, it was how she understood the game. And just as Roxanne described needing metaphorical connections between science and the arts to learn STEM concepts ("I teach statistics like that. 'It's like the Platonic forms! The standard normal distribution is like the Platonic Ideal!'"), she found that having the visual of the board game helped ground her understanding of the nitrogen cycle: "so when you throw out all these chemical compounds, elements names … I could start to map it in my brain a lot better."

This link highlights a breakthrough in GBL identity development that Campbell describes as the "ultimate boon" of the hero's journey. Seeing beyond the apparent opposition between the Student identity (with its institutional constraints, academic affinity groups, and struggle for agency) and the Gamer identity (with its laughter-infused sociality and a commandment of competition that presupposes player agency), the true game-based learner can achieve the epistemic frame the game was designed to impart. The NGame was not designed to foster a professional epistemic frame in the way that Shaffer (2005) describes; however, the game was designed to foster an appreciation for complexity and an intrepid spirit in the face of daunting content

(personal communication with the designers). In this regard, we can say that the NGame, loosely, aims to encourage its players to think like scientists. The identity of Scientist is the ideal projective identity, in Gee's (2007) terms, for players to adopt during the NGame. The hope is that when a Student is allowed to play a Gamer in class, they will become a Scientist.

Initiating the Scientist: Seeing Beyond Dualities

At this point in my argument, I will take Campbell's advice and stop splitting my findings between Gee's descriptions of static identities and Campbell's process-oriented narrative lens. Not only is this appropriate given the content of Campbell's framework, it is pragmatic: it is difficult to talk about the initiation phase of the hero's journey in game-based learning without simultaneously talking about the identity that emerges from it. Recall that the projective identity as Gee (2007) describes it in gameplay is the type of character the real-world player wishes the virtual character to be, "within the limitations of [the virtual character's] capacities, of course, and within the resources the game designer has given [the player]" (p. 50). In my study, the real-world identity of the player is that of the Student, and the virtual character is that of the Gamer. The question then arises, what kind of person does the Student want the Gamer to be or become? How does the Student wish the Gamer to behave?

When we look at these questions with Campbell's perspective in mind, we realize that for meaningful change to occur the interaction between Student and Gamer must, to some degree, abolish the very distinction between these two senses of self.

This can happen through the process of emergence involved in establishing a projective identity: the interaction between the carefully cultivated selves of Student and Gamer gives rise to a new identity, capable of new action. We hope that emergent self will be a Scientist, but the road of trials is not always easy; reconciling opposites proves a challenging task for the young heroes with whom I spoke.

The struggle begins with the question of how the Student side of a player thought the Gamer side should approach the NGame. Again and again, my participants set fun/engagement and learning against each other. This was surprising because the marriage of fun and learning is one of the cornerstones of game-based learning theory. Eager as my participants were to adopt the semi-expert rhetoric of personal learning styles, they were hesitant to recruit a coherence system based on the burgeoning GBL conversation in today's research community. When I asked Diane if she thought the NGame helped her learn the nitrogen cycle, her response exemplified the sharp distinction she and her fellow narrators drew between fun and learning:

> I think it was [helpful], I think, again, that I would have wanted more time with it, and also I think there's a significant attitude component to the game. Where you have to, uh, I think since it's a game you kind of have to go in, like, thinking, 'I'm gonna use this to learn,' and not like, 'I'm gonna use this to just play around for 50 minutes.'

As she elaborates on her gameplay experience, we see that these two intentions are linked to the Student and Gamer identities respectively. Rather than finding an emergent identity space where playing with the game could, in and of itself, be a form of learning, Diane oscillates between recruiting her Student and Gamer selves.

> Yeah, uhm, uh, I think, I think everybody in my group, I mean… everybody in my discussion section certainly, like, wanted to do well and wanted to learn the nitrogen cycle. But, I think, I – my group got very competitive. *<laughter>* So there was a lot of trash talking, you know, happening, and just kind of, uhm … yeah, uhm … we were also having fun while we were learning, but my impression was that, was that everybody was kind of, they did want to learn it, but I think that if maybe we had sat down maybe with more time and had been just sort of… more attached to the idea that we were going to master it.

Taking her cue from the academic institution that sets the learning agenda for her Student identity, Diane continually asserts that she and her group mates did "want to learn." The way she tells the story, however, the Discursive-identity of the Gamer subverted this goal. Diane interacted with her fellow players as Gamers by "trash talking" and "having fun," and she stories this enactment of identity as precluding the content mastery her Student self valued.

This tension comes out even more strongly in some of the graduate students' words. Ashley, who never found her identity footing as a Gamer, relies heavily on her Student identity as she tries to imagine "how we would learn by this game."

> I wanted to be, like, 'Oh! You're supposed to be able to know what this card does,' versus having it be, like, it tells you, you don't really have to think about the cycle while you're playing. I just feel like, I remem – like, when you had a card it just told you, like, 'N-fixing bacteria,' or something, but, like, it tells you the instructions, like, how to play it or where to play it or something like that, where I think if it made you work a little harder, maybe that would slow down the game, but if you had to connect, like, N-fixing bacteria, this is where it is in the cycle.

The phrases "supposed to" and "work a little harder" come right out of the Student's D-identity; these phrases reinforce the edicts of an institutional authority that lays out

rules for action and expects hard work from its constituents. Abby echoes this sentiment of learning by obligation as she describes her own gameplay experience:

> What I remember most was how competitive our group was and how quickly we lost sight of the fact that we were supposed to be learning something and not trying to beat each other.

Again, the words "supposed to" appear; again, the intention to learn is set by the institutional context that supports the Student identity, but not that of the Gamer who becomes "competitive." Abby gives this intention full voice as she describes her desire to learn the "minute details" of the game,

> to get to a point where you're quizzing each other on it, or not allowing yourself to read the whole card and just knowing by what you're looking at – I don't know how you could force yourself to learn what's on the cards.

"Quizzing," "not allowing," "force yourself to learn" – these are exactly the sort of phrases many GBL designers and educators hope to avoid by bringing games into the classroom. Using these terms and setting the situation they describe as an ideal learning environment accomplishes a great deal of Student D-identity and I-identity work. The traditional academic institution that we saw placing constraints on my participants in their identities as Students provides the context in which quizzes are the primary mode of assessing learning gains and where learning is often a process of restriction and enforcement.

For the GBL educator, this staunch separation of the Student and Gamer identities is alarming. As Gee (2007) cautions, "if [students] cannot or will not make

bridges between one or more of their real-world identities and the virtual identity at stake in the classroom… [then] learning is imperiled" (p. 57). Just as it seems that our Student hero will not be able to "[discover] and [assimilate] his opposite" (Campbell 1949, p. 108), we begin to hear a synthesis emerging. As Abby continues her narrative, she seems to break past the dualities she at first so clearly defined. Recalling previous gameplay experiences, she constructs a new scenario in which Student and Gamer cease to be mutually exclusive identities:

> I'm thinking of other games I play where when you first start learning – other strategy games – when you first start learning you read everything, but then it becomes second nature as you play it. So maybe it's a matter of playing the game enough so that you're not trying to learn it, you're just playing it enough that you know everything on the cards – and then you know everything on the cards and then you know all the information. That's the easiest way to learn – when it doesn't feel like work. It's just fun and suddenly, you know it all!

There are a few important rhetorical moves, here. First, Abby attributes learning to non-educational games. Second, she classifies the NGame as a "strategy game." This classification places the NGame in a class of activities that is at once fun and cognitively engaging. Through this chiastic switch of attributes, learning becomes an activity of the Gamer and the Student can practice her critical thinking through gameplay. Suddenly, instead of needing to "force yourself to learn what's on the cards," "you're not trying to learn it, you're just playing it enough." Through the idea of repetition (playing it enough), play and learning become synonymous. By imagining repeated play, Abby-as-Student is able to "[transmute] the infantile images of [her] personal past" (Campbell 1949, p. 101) – the image of a game as purely entertaining – into a newly meaningful

tool for learning. This is the key task of the hero in the throes of initiation. This is also the hallmark of the crucial "repair work" Gee (2007) notes is often necessary for a significant projective identity to emerge. Roxanne recruits a similar identity space when she postulates,

> If I had to play that game once a week, all semester, I would know what bacteria did what and what they were called and I would, like, *own* the nitrogen cycle.

Time and repetition are the key elements that make Roxanne and Abby's projective identities as Gamers-who-Learn imaginable. In conceiving of this possibility, what identity trials have these narrators overcome?

Two of the quintessential hero tasks, as Campbell (1949) describes them, are the meeting with a temptress and the atonement with the father. For a hero to achieve enlightenment, he must recognize that the apparently "base" physicality of the temptress is, in fact, divinity. We see that basic plotline transpiring in the above quotes as Abby and Roxanne come to see games as valid spaces for learning, rather than only as enticing arenas for distracting play. The play out of which Students had to be "forced" became the very vehicle of their instruction. Campbell argues that the hero's main quest is for "mastery of life" (p. 120),

> but when it suddenly dawns on us, or is forced to our attention, that everything we think or do is necessarily tainted with the odor of the flesh, then, not uncommonly, there is experienced a moment of revulsion: life, the acts of life, the organs of life, woman in particular as the great symbol of life, become intolerable to the pure, the pure, pure soul (p. 121).

Something similar happened when our heroes sought to master the nitrogen cycle through a game. Despite the powerful link between flow states and learning, play and creativity (Csikszentmihalyi 1990), the game still elicited a "moment of revulsion" for Students who have adopted an Institutional-identity that privileges tight control and prescribed learning outcomes. Letting go of the idea that learning is a "pure, pure" activity devoid of such basic human emotions as competitiveness or fun, Abby and Roxanne narrated their way to a space where "consciousness came to be amplified" (Campbell 1949, p. 121).

Less obvious is the work these narrators performed to execute what Campbell describes as the "atonement with the father" (p. 126). Essentially, this is the hero's process of rebelling against authority only to discover that he holds authority within himself; he and the father (symbol of authority) become one. Previously I noted that my participants frequently averred their desire to learn the nitrogen cycle despite getting caught up in the game. While these borderline apologetic statements signal the I-identity of the Student at work, the locus of intentionality has shifted. Describing their typical classroom activities, my participants never reassured me that they "wanted to learn;" that intention was present in the assignments themselves. By disrupting the normal environment of the classroom, the NGame allowed these speakers to confront their own intent to learn. From this perspective, when Diane says that there is a "significant attitude component to the game," she recognizes the fact that the power to decide whether or not to learn rests firmly in her hands. The academic institution certainly supports her learning project, but instead of deferring to the academy, Diane

must now choose for herself how to shape her focus during gameplay. The fact that her choice is the same as that which the institution would make for her (to learn) underscores the power work her narrative has accomplished in collapsing identity dualities. In the process of initiation, the hero executes a "penetration to some source of power" (Campbell 1949, p. 35): here is one instance of that achievement.

All of this work, however, still does not quite indicate the presence of what Steinkuehler (2008) describes as the "scientific habit of mind" which characterizes the projective identity we hope the NGame allows players to adopt. Steinkuehler's study offers empirical evidence of model-based reasoning, systems reasoning, and evaluative practice characteristic of the scientific method in *World of War Craft* online discussion forums. While my study was not designed to assess student's epistemological development, my participants nonetheless do evince some of the habits Steinkuehler outlines. Since her study looks for scientific reasoning in a context where players were not explicitly asked to produce it, it offers a rich template for recognizing meaningful utterances in the context of my interviews, which focused on student experience rather than content or skill mastery. In particular, once my narrators had recognized the power of the NGame as a learning tool and reconciled their own personal authority with that of the classroom context, they began to show signs of what Steinkuehler categorizes as "model-based reasoning" (Table 2, reproduced from Steinkuehler 2008, Table 1).

Table 2. Codes used by Steinkuehler (2008) to identify two forms of model-based reasoning in Word of War Craft discussion forums.

Forms of Reasoning	Description

Model based reasoning	Model-based reasoning involves the envisionment of a principle-based mechanism with interacting components that represents the operation of system within the natural (virtual) world. A model may concretize phenomena that are not directly observable (Mayer 1992; AAAS.11.B)
Model testing and prediction	The usefulness of a model can be tested by comparing its predictions to actual observations in the real world. But a close match does not necessarily mean that the model is the only ''true'' model of the only one that would work (AAAS.11.B.12.2)

When explaining her experience with the NGame to me, Jessica narrated a

moment of confusion.

> Uhm, the thing is that you're, like, at one point in the game and you, like, pick a card and you're like, 'oh, they can go back here.' I mean, that didn't really make sense. Is that, does that, is that actually how it happens in… natural… life? You know what I mean?

I asked her to elaborate and she began to trace the shape of the board with her hands

on the table in front of us.

> Like, you know how there's a circle? And there's, like, like, N_2 is right here, then you, like, go through the cycle – if you're right here and, like, someone picks a card, and so you make the people go back and they can't win as quickly? Is that actually how it happens in real life? Like, can they go from this state to this stage?

By asking these questions, Jessica relates to the NGame as a model of the nitrogen

cycle. By describing the board and physically acting out the movements of the nitrogen

atoms she advanced through the game, Jessica "concretize[s] phenomena that are not

directly observable" – the phenomena of chemical transformations in the soil. When she

asks whether a game mechanic actually reflects "real life," she is performing a basic type

of model testing, attempting to see if the cycle as the game depicts it is a "close match"

for how the cycle functions in an actual ecosystem.

Lev also describes the game as a model. When I asked him, "if your friends asked

how you learned the nitrogen cycle, what would you tell them?" he replied,

> *Lev*: I'd probably tell them… I'd probably tell them about the game,
> actually. Yeah, just, like, there's this game that you play and you just
> follow nitrogen around and this is how it gets from place to place and
> obviously not everything from the cycle was in the game and so you
> could explain different side parts.
> *Julie*: How accurate do you think the game was?
> *Lev*: Overall, it was pretty accurate – but obviously there are all kinds of
> branches you could take, it's not a complete cycle.

Through his use of the word "obviously," Lev establishes the game's model-like nature

as a given. In my interviews, I never heard a student refer to any other scientific model

so clearly. Textbooks and worksheets surely offered visual models of the nitrogen cycle,

but the speakers did not assume they left out information. More importantly, the

speakers did not assume the authority to be able to "explain different side parts" that

were missing from other models. In the quote above, Lev has accomplished some

impressive projective identity work: he has leveraged the practical knowledge of a

Gamer (game mechanics are constructions that may mirror life, but not exactly replicate

it) with the receptive posture of the Student (who asks, what can I learn from the way

this game models life?).

How is such identity work possible in the space created by the NGame? To

address this question, we return to the concept of the psychosocial moratorium. This is

the space that Gee (2007) describes as allowing "the learner [to] take risks where real-

world consequences are lowered" (p. 59). This aligns with Campbell's portrayal of "the dangerous crises of self-development" that become less perilous "under the protecting eye of an experienced initiated" (Campbell 1949, p. 9). I heard evidence in my participants' narratives of both Gee's safe learning space and Campbell's assisting elder. My favorite example of the former is this little gem of logic from Lev's narrative of the end of gameplay:

> We ended up, we were one of the last groups in there. We just kept playing, I guess, and we were way behind our opponents, so I guess it was a tie.

Savor that one for a moment: we were way behind our opponents, *so I guess it was a tie*. In three and a half years working as a graduate teaching assistant I never once heard a student say anything similar about an exam. "I got a C, my friend got an A, but hey, we both learned something so I guess we're about the same!" I don't think so. A game offers a unique a space to experiment, to become familiar with new terms and processes, to laugh – and not to worry too much about who wins or who loses. What Lev's comment tells us is that the NGame creates a space where performance is motivation, not evaluation. As Lev puts it, "it's not competitive like you really want to win, like you still, you want to learn, but you also want to try to win." We have encountered this division of learning and playing before, but here it highlights the gentler learning space that games provide: there are risks, but they are not life-threatening. The NGame is not cut throat (unless, of course, you're playing Roxanne, who made it very clear she wanted to "*win at nitrogen!*"). If there was ever a testament

to the NGame's ability to generate a psychosocial moratorium, "we were way behind our opponents, so I guess it was a tie" has to be it.

The NGame is not solely responsible for the atmosphere it creates in class, however. A GBL activity can be scaffolded to different degrees, and integrated into the curriculum or left to stand alone. In Intro Bio, the undergraduates report very little discussion around the game. Lev tells us that "there wasn't any discussion, at least not for us because it takes the whole period to play." Even outside the discussion classroom, the nitrogen cycle appears to have gotten fairly short shrift. Jessica explains that the professor

> went over it really quickly because at that point it was the end of the school year and he was trying to get through things.

Nonetheless, both Jessica and Lev managed to relate to the game as a scientific model after playing just once. In Ecology, the situation was quite different. I helped the professor to design a three day curriculum around the nitrogen cycle, involving an introductory lecture, game day, and a question and answer session. As part of this module, students completed an essay reflecting on the game and suggesting possible expansion packs or areas where the game did not match up neatly with reality. I was pleased to hear Abby bring up the assignment herself, as she discussed the possibility of incorporating agricultural concepts into the game.

> *Abby*: Thinking about what, what characteristics are necessary for each type of microbe to perform their function, and we were thinking of the implications of that for agriculture.
> *Julie*: Were you talking about that in your group?

Abby: Yeah, and I know we talked about it after that discussion, too, wondering if that could be incorporated into the game, now typing in the fact that this means moist anaerobic conditions to flood conditions – and if you over irrigate or if you have spring flooding – why you may not want to have a lot of nitrogen on the ground under those circumstances, I think it made us think more about that. … In our critique of the game, we talked about how it didn't really address agriculture as much and I think in having that discussion it made you think about it more deeply than we would have otherwise.

Here, Abby, with the assistance of her classmates and the reflection assignment is able to not only think of the NGame as a scientific model, but to propose modifications of that model that would better represent a given aspect of the real world. The instructor and the other members of Abby's affinity group act as the "experienced initiate" and co-adventurers, enabling Abby to enact the projective identity of the Scientist.

We have now seen how, through narrative means, the six heroes of our tale confronted the Student/Gamer duality and sought the "ultimate boon" of an emergent, projective identity as Scientist. The safe environment afforded by the game, along with thoughtful course structuring and the support of an affinity group, bolster the heroes in their efforts. But, the story does not end here. Campbell (1949) is quick to point out that the journey back from the world of the unknown is just as perilous as the journey out. As we consider the return of the GBL hero, we look back on the journey thus far and address the educational issue of transfer: will what students learn and become during gameplay withstand the transition back to the everyday world of classes, jobs, professions, and other academic pursuits?

The Return: Concluding the Adventure

At the conclusion of the monomyth, the hero returns to the world "as one reborn, made great and filled with creative power" (Campbell 1949, p. 36). Unfortunately, it is not as easy as simply showing back up. In myth, heroes often have to flee from whatever contest they fought over the prize at the end of their quest. Others refuse to return at all, "[f]or the bliss of the deep abode is not lightly abandoned in favor of the self-scattering of the wakened state" (p. 207). Yet other heroes must be rescued from depths and brought back to the world by supernatural aide. We can imagine that aid to take the shape of reflection discussions like the one that Abby prized for highlighting the role of nitrogen in agricultural land. A complete refusal to return would correspond to a total lack of transfer – a student might play a game, enjoy it, but get nothing at all from the experience. The final option, the "magic flight" (p. 196), is an apt metaphor for the end of a serious game. "A lively and often comical pursuit," this form of homecoming occurs when "the hero's wish to return to the world has been resented by the gods or demons" (p. 197). Given the tension between the I-identity of the Student and the D-identities, or standard play behaviors, of the Gamer, this description seems fitting.

And yet, for most of my participants, there simply was not enough time for a meaningful transition back into the classroom. I heard many variations on Abby's remarks: "it seemed like as soon as we were kind of getting into it, it was time to stop and have our discussions." Speaker after speaker told me that they wished they had had longer with the game. We heard earlier that Roxanne and Abby cited time and

repetition as two key ingredients for successful engagement with the NGame. For the students I spoke with, these ingredients were in short supply. A future inquiry might follow students who are able to play the NGame several times, or who have even more follow-up activities to help them transition out of the game world.

This is not to say that my participants came back empty handed. As we have already seen, several were still able to think of the game in terms of model-based reasoning even after two or more months had passed (my interviews were all held the semester after each student played the game). On a shorter time span, Roxanne also notes that the question and answer session in Ecology,

> the class where we digested the game, was actually the most helpful class we had on the nitrogen cycle. And I think that playing the game primed me for that class, so the game as a primer… for me, personally, because I could visualize where things were on the board because I've very visual … I think that the game, having the visual of the game – what's the word, not tactile, but kinesthetic experience of the game was useful for the next class's lecture Q&A because I had this context in my head where even if I didn't know how they all fit together on their own, when people asked questions about them I could say, 'Oh, that's from that place.' I could start to map it in my brain a lot better.

By providing space for students to ask questions about the nitrogen cycle after playing the game, Ecology helped to ferry my participants back from the game world to the academic arena. Part of this transition seems to require establishing some link between the Student and the Gamer (or Scientist). In this case, Roxanne calls on her N-identity as a visual and kinesthetic learner to explain how playing the game helped her later in class. Even Ashley remarked on the value of this discussion; having struggled to enjoy or

profit from playing the NGame, this discussion constituted a time for her to rejoin her affinity group after feeling estranged during gameplay.

Beyond the classroom, Roxanne even foresaw benefits to her professional life. Having had the opportunity to playfully engage with the nitrogen cycle, Roxanne was able to "learn it in the moment" and thereby gain enough literacy to recognize, if not fully participate in, the semiotic domain (Gee 2007) of biogeochemists and agriculturalists:

> I wanted to learn, like, if someone brings up nitrification, I need to understand, like, 'what is the process that they're talking about?' and can I actually have an intelligent conversation where I could ask a good question. So not, like, 'Ah! Yes! And then this happens and then these bacteria come in! And here is what they are called! And this is what - !' So, I was really not trying to absorb it in a detailed way.

While Roxanne had taken on an almost apologetic tone, the outcome she describes is one of the key goals of game-based learning. To gain access to a new semiotic domain and be able to participate in new affinity groups, even just as a guest, is a significant identity accomplishment. Roxanne had relinquished what Campbell might call the "infantile" Student impulse to memorize details ad infinitum, and had embraced the participatory identity of the Gamer. As a result, she returns from her self-proclaimed "learning adventure" with Student, Gamer, and Scientist identities flourishing. A grand quest, indeed.

As the game faded into memory, I was left pondering one last insight from Jessica's narrative. Contemplating the intricacies of choosing an undergraduate major, she offered this lament:

It's difficult, because even if you don't enjoy the classes [for a particular major], if you actually go out into the career field, you might actually really love it, but how do you know? Because you can't even go through the courses? But, things you gotta go through to get to certain places, right?

Not all games offer a preview of professional activities (though Shaffer's (2005) epistemic games are certainly designed with this aim). Yet, there remains something unique about the learning space a game provides. What I take away from my participants' narratives is the sense of flexibility a game affords its players: flexibility to try on new identities, struggle with old ones, and discover new capacities within themselves. Such spaces are incredibly important, given the institutional constraints that often obscure valuable vantages of self from the students who need them most. As game-based learning research proceeds, I hope that more student selves and voices make it into the literature, as these Students, Gamers, and future Scientists are the bright heroes for whom we create the epic worlds of educational games.

Implications

Perhaps the most important take-away from this study is the imperative to dig deeper in our investigations of game-based learning. It would be easy to read quotes like Abby's – "we lost sight of the fact that we were supposed to be learning something and not trying to beat each other" – and dismiss games as learning tools. A quick, decontextualized reading of that remark suggests that the NGame is too fun, and therefore too distracting, to foster meaningful learning. A narrative approach returns

our attention to the ways in which context and identity interact, revealing that remarks like Abby's can in fact be good signs. Insofar as they signal a struggle to reconcile Student and Gamer identities, quotes like this denote a player in the midst of a dynamic learning journey; they suggest that the speaker is poised for significant growth. Having fully engaged with the experiences of one identity (the competitive Gamer) while still attentive to the project of another identity (the goal-driven Student), a speaker at odds with herself during GBL is a speaker immersed in the emergent process of forming a new identity. Given the proper scaffolding, students in this condition can learn a great deal, and come away from gameplay with a greater sense of agency over their learning.

The need for scaffolding is a second vital implication of this study. The tendency in some GBL literature to focus on the game as unit of study is misleading. Serious games are embedded in the powerful context of school: we cannot say a game is a game is a game. The circumstances of gameplay matter greatly. Instead of attempting to evaluate the success or failure of a given game, researchers would benefit from a focus on how students experience games in relation to other course activities as well as how games are integrated into the learning modules they support. In this regard, games are similar to text books – a given text may suit some purposes and not others. One teacher may use the text effectively, while another falters. Different instructors may use the same game very different, but both to great effect. It behooves us to attend to these variations if we want to understand how games work in classrooms. Just as it would be unproductive to deem a textbook "good" or "bad" in and of itself, it seems similarly fruitless to focus our efforts on evaluating specific games and not the ways in which

they are deployed. Granted, some text books are clearly flawed as are some games. We can hope that these issues will be readily evident; the finer degrees of nuance, however, require a more attention.

In terms of suggestions for educators, this study highlights the utility of dedicating class time to reflect on gameplay and address any questions students developed while playing. As we saw above, such reflection periods are helpful both to those students who deeply engaged with gameplay and those who found gameplay ineffective. Such variation is unavoidable in classrooms where each student brings their unique life experiences to each activity; finding ways to bring everyone back to the same page will be very important, especially when dealing with interventions as dynamic as games. Writing or other creative reflection assignments are also excellent ways to foster critical thinking about gameplay. Taking a cue from Abby's comments about the agricultural implications of the NGame, one intriguing assignment might be to ask students to draft expansion packs for the game. Such a task would serve the dual purpose of prompting conceptual transfer and tying the game into whatever particular aspect of the NGame a given class wished to draw out (the importance of nitrogen for agriculture, forest conservation, microbiology, etc.). We should not leave our heroes alone on their journey back from the trials of gameplay: supernatural aid is a crucial part of the Student-Gamer's journey.

Importantly, this finding should reassure instructors who worry about games making their profession obsolete. The reality is quite the reverse. As we have seen, students can be puzzled by the appearance of a game in the classroom. While their role

shifts from information giver to guide or mentor, teachers are absolutely vital parts of a game-based learning classroom. This is true whether a given game "works" or not. For eager students who easily find their identity footing as Student-Gamers, teachers can be guides who point the way to further resources outside the game. For students who struggle to engage, teachers can help them see connections between the game and their coursework or life experiences.

Finally, this study reminds us of the importance of including student voices in the games and learning literature. Not only does this practice yield some highly enjoyable results, it reinforces the values of the games and learning movement generally. As researchers, we must practice what we preach. If we believe that individuality and context are important, we must find ways to privilege these in our studies. The result is a much more intimate look at gaming. This intimacy affords us unexpected insights and ignites new areas of research. But most importantly, it honors our investment in students. What else is the GBL endeavor about if not improving the caliber of educational experiences? Affective and cognitive outcomes give us one set of valuable insights into this process. They are necessary avenues of inquiry, but they are not sufficient. Qualitative approaches are in all likelihood what will help us understand surprising findings like those in Wouters et al. (2013). There comes a point were numbers no longer help us tease apart the complex dynamics at work in classroom gameplay. We have to go to the source. We have to talk to our students.

Gaming the Future

This study suggests directions for future research in both qualitative and quantitative modes. There is still much to be learned from narrative analysis of student experience. In its simplest evolution, a follow-up study would benefit from additional qualitative techniques. An inquiry that incorporated interviews throughout the semester and game module would be very valuable. Such an investigation could shed light on how student's characterization of themselves as Students and Gamers changes throughout the gaming process. Including small group interviews could also reveal more about how social dynamics play into local identity construction around gameplay. Moving away from a strict focus on student accounts, classroom observations would be a valuable data source for qualitative reflection. In this way, researchers could be an audience to "stories lived," which Clanndinin and Connelly suggest are important to attend to, as they form the basis of an individual's narratives (2000, p. xxvi).

With these tools, researchers could ask deeper questions about the intersectionality of Gamer and Student identities with other institutional, affinity, discursive, and natural identities. These insights would go a long way towards building effective curricula around serious games. If we are better able to understand the dynamic tensions and affordances students experience within themselves as they play, we will be better equipped to guide students' learning adventures.

Findings from such studies would also prepare us to more cogently interpret findings from quantitative studies. First, we will be able to more carefully consider how contextual factors may have impacted content mastery. In a mixed methods study, this

would be particularly useful, as we would be able to trace connections between students' narratives of identity work and their aggregate trends in academic progress. Even across studies, insights from narrative and other qualitative analyses will shed great light on the otherwise hidden processes that account for changes in reported motivation, interest, or achievement. Importantly, open-ended studies permit us to be receptive to outcomes we could not forsee, and therefore would not have thought to measure. For instance, Lev's comment equating being far behind his opponents with a tie merits further investigation. Is this a common assumption? In future interviews, researchers could ask students to describe the outcome of the game and even manipulate games such that they ended early in order to gain a better understanding of how students relate to outcomes in gameplay versus academia. Certainly, a greater emphasis on how players thought about and coped with in game failure would be warranted.

On the quantitative side of the spectrum, this study suggests several variables that deserve greater scrutiny. One is the manner in which a game is deployed in a classroom. Here we saw that the undergraduates tended to struggle with the Return phase of the hero's journey, as they were never given the guidance received by the students in Ecology in the form of in-class discussions and reflection assignments. Comparing outcomes among different curricular models using the same game would help educators determine best practices for game implementation – as well as highlight any problems with game design, as these would likely manifest across contexts. In particular, it would be illuminating to compare the content acquisition of students who

played the NGame in one-on-one matches as opposed to students who played as part of a team. Would students in teams perform better, having had to communicate with each other and use terms from the cards and board out loud? Would students who played alone perform better because they had more time to absorb what was happening during the game, rather than becoming involved in side conversations? Do other identity affiliations mediate this effect – that is, do introverts learn better playing solo? These are questions that could be fruitfully explored using quantitative models.

Game-based learning research is picking up steam, and future years will undoubtedly see many studies that seek to elucidate better game design principles and formats for curricular integration. What the present study reminds us is that we must keep students at the forefront of our thinking as we pursue these structural goals. As we do so, a narrative understanding will be indispensable. As Elliot Mishler reminds us, "Metaphorically, we speak – or sing – ourselves as a chorus of voices, not just as the tenor or soprano soloist" (1999, p. 8). Attending to the seemingly simple stories of students classroom experience is a powerful way of listening to these voices. To carry the metaphor further, if we spend too much of our focus on the sheet music, we will be poor conductors indeed. The sextet that sung to us in this study remind us that researchers are students as well, perhaps the ultimate students. We have just as much to learn from those who play our games as they do from the enticing worlds those games create. In conclusion, then, if I had to summarize the moral of this research story in one word, it would be this: Listen.

References

Adams, D.M., Mayer, R.E., MacNamara, A., Koenig, A., Wainess, R. (2012). Narrative Games for Learning: Testing the Discovery and Narrative Hypotheses. *Journal of Educational Pyschology*, 104(1), pp. 235-249.

Balser, T. (2011). Can the N Cycle Be Fun? Using a game to address a teaching challenge. Presentation at Iowa State University.

Barab, S.A., & Roth, W. (2006). Curriculum-based ecosystems: supporting knowing from an ecological perspective*. Educational Researcher*, 35(5), pp. 3-13.

Barab, S.A., Gresalfi, M., & Arici, A. (2009). Why educators should care about games. *Educational Leadership,* 67(1), pp. 76-80.

Barab, S.A., Gresalfi, M., Ingram-Goble, A. (2010). Transformational play: using games to position person, content, and context. *Educational Researcher,* 39(7), pp. 525-536.

Blakely, C. *The Role of Narrative in the Design of an Educational Game.* Diss. University of Wisconsin-Madison, 2012.

Blumberg, F.C. & Altschuler, E. (2011). From the playroom to the classroom: children's views of video game play and academic learning. *Child Development Perspectives*, 5(2), pp. 99-103.

Blumberg, F. C., & Fisch, S.M. (2013). Introduction: Digital games as a context for cognitive development, learning, and developmental research. In F. C. Blumber & S.M. Fisch (Eds.), *Digital Games: A Context for Cognitive Development. New Directins for Child and Adolescent Development,* 139*,* pp. 1-9.

Burke, A. (2013). Children's construction of identity in virtual play worlds – a classroom perspective. Spec. issue of *Language and Literacy*, 15(1), pp. 58-73.

Campbell, J. (1949). *The Hero with a Thousand Faces*. New Jersey: Princeton University Press.

Capps, L. & Ochs, E. (1995). *Constructing panic: The discourse of agoraphobia*. Boston: Harvard University Press.

Charsky, D. (2010). From Edutainment to Serious Games: A Change in the Use of Game Characteristics. *Games and Culture,* 5(2), pp. 177-198.

Chee, Y.S. (2007). Embodiment, embeddedness, and experience: game-based learning

and the construction of identity. *Research and Practice in Technology Enhanced Learning*, 2(1), pp. 3-30.

Childs, M. (2011). Identity: A primer. In A. Peachey & M. Childs (Eds.). *Reinventing Ourselves: Contemporary Concepts of Identity in Virtual Worlds*, (pp. 13-31). London: Springer-Verlag.

Clandinin, D.J, & Connelly, F.M. (2000). *Narrative Inquiry: Experience and Story in Qualitative Research*. San Fransisco: Jossey-Bass.

Csikszentmihalyi, M. (1990). *Flow: The Psychology of Optimal Experience*. New York: Harper Collins Publishers.

DeVane, B. (2012). Beyond the screen: game-based learning as a nexus of identification. In van Aalst, J., Thompson, K., Jacobson, M. J., & Reimann, P. (Eds.) *The Future of Learning: Proceedings of the 10th International Conference of the Learning Sciences (ICLS 2012) – Volume 1, Full papers.* International Society of the Learning Sciences: Sydney, NSW, AUSTRALIA.

DeVane, B., & Squire, K.D. (2008). The meaning of race and violence in Grand Theft Auto: San Andreas. *Game and Culture*, 3(3-4), pp. 264-285.

Dewey, J.(1938). *Experience and Education*. New York: Touchstone.

Dickey, M.D. (2011). Murder on Grimm Isle: The impact of game narrative design in an educational game-based learning environment. *British Journal of Educational Technology*, 42(3), pp. 456-469.

Dunn, R., Griggs, S.A., Olson, J., Beasley, M., & Gorman, B.S. (1995). A meta-analytic validation of the Dunn and Dunn model of learning-style preferences. *The Journal of Educational Research*, 88(6), pp. 353-362.

Feinstein, N. (2010). Salvaging science literacy. *Science Education*, 95(1), pp. 168-185.

Fies, C., & Langman, J. (2011). Bridging worlds: Measuring leaner's discursive practice in a partsim supported biology lesson. *International Journal of Science and Mathematics Education*, 9, pp. 1415-1438.

Frazier, J.G. (1890). *The Golden Bough: A Study in Magic and Religion*. New York: Oxford University Press.

Frick, M.J., Kahler, A.A., Miller, W.W. (1991). A definition and the concepts of agricultural literacy. *Journal of Agricultural Education*, 32(2), pp. 49-57.

Garris, R., Ahlers, R., Driskell, J.E. (2002). Games, motivation, and learning: A research and practice model. *Simulation Gaming*, 33(4), pp. 441-467.

Gee, J.P. (2000). Identity as an analytic lens for research in education. *Review of Research in Education*, 25(2000-2001), pp. 99-125.

Gee, J.P. (2007). *What Video Games Have To Teach Us About Learning And Literacy*. New York: Palgrave MacMillan.

Geoffry, T., & Durant, J. (1987). Why should we promote the public understanding of science? *Scientific Literacy Papers: A Journal of Research in Science, Education and Research*. pp. 1-14.

Graue, M.E., & Walsh, D.J. (1998). *Studying Children in Context: Theories, Methods, and Ethics*. London: Sage Publications.

Grumet, M.G. (1987). The politics of personal knowledge. *Curriculum Inquiry*, 17(3), pp. 319-329.

Habgood, M.P.J. (2005). Zombie Division: Intrinsic integration in digital learning games. Paper presented at the 2005 workshop on Human Centred Technology Brighton, UK.

Habgood, M.P.J, & Ainsworth, S.E. (2011). Motivating children to learn effectively: exploring the value of intrinsic integration in educational games. *Journal of the Learning Sciences*, 20(2), pp. 169-206.

Hidi, S., & Renninger, K.A. (2006). The four-phase model of interest development. *Educational Psychologist*, 41(2), pp. 111-127.

Holmes, J. (2012). Hunting for Identity: Community, Performance, and the Curious Case of the "Huntard" in World of Warcraft. In Martin, C., Ochsner, A., & Squire, K. (Eds.). *Proceedings GLS 8.0 Games + Learning + Society Conference*, pp. 136-144.

Introductory Biology, retrieved December 8, 2013 from http://www.zoology.wisc.edu/courses/151-152/index.html

Ip, H. (2011). Narrative structures in computer and video games: part 1: context, definitions, and initial findings. *Games and Culture,* 6(2), pp. 103-134.

Johnson, A.S. (2008). The moral of the story: agency in preservice teachers' literacy stories. *English Education*, 40(2), pp. 122-144.

Johnson, S. (2012). Theme is not meaning: who decides what a game is about? In

Steinkuehler, C., Squire, K., Barab, S. (Eds.). *Games, Learning, and Society: Learning and Meaning in the Digital Age*. Cambridge: Cambridge University Press. pp. 32-39.

Ketelhut, D.J. (2007). The impact of student self-efficacy on scientific inquiry skills: an exploratory investigation in River City, a multi-user virtual environment. *Journal of Science Education and Technology*, 16(1), pp. 99-111.

Kolb, D.A. (1984). *Experiential Learning: Experience as the Source of Learning and Development.* New Jersey: Prentice-Hill.

Kondo, D.K. (1990). *Crafting Selves: Power, Gender, and Discourses of Identity in a Japanese Workplace*. Chicago: The University of Chicago Press.

Kozak, K. and Dvorak, J. (2011). New methodology for the use of board games in the classroom: Ekopolis case study. In Ruokamo, H., Eriksson, M., Pekkala, L., Vuojarvi, H. (Eds.). *Social Media in the Middle of Nowhere: Network-Based Education Conference*. pp. 58-66.

Labov, W. (1972). *Sociolinguistic Patterns*. University of Pennsylvania Press.

Lee, J.J., & Hoadley, C.M. (2007). Leveraging identity to make learning fun: possible selves and experiential learning in massively multiplayer online games (MMOGs). *Innovate*, 3(6).

Linde, C. *Life Stories: The Creation of Coherence*. 1993. Oxford University Press.

Markey, M., Swanson, F., Jenkins, A., Jennings, B.J., St. Jean, B., Rosenberg, V., Yao, X., Frost, R. (2008). Designing and testing a web-based board game for teaching information literacy skills and concepts. *Library Hi Tech*, 26(4), pp. 663-681.

Martin, C. (2012). Video games, identity, and the constellation of information. *Bulletin of Science, Technology & Society*, 32(5), pp. 384-392.

Mayo, M.J. (2009). Video games: A route to large-scale STEM education? *Science*, 323(5910), pp. 79-82.

McAdams, D.P. (1988). *Power, Intimacy, and the Life Story: Personological Inquiries into Identity*. New York: The Guilford Press.

Mishler, E.G. (1999). *Storylines: Craftartists' Narratives of Identity*. Cambridge: Harvard University Press.

Mitgutsch, K. (2009). Passionate digital play-based learning (re)learning in computer

games like shadow of the colossus. *Eludamos. Journal for Computer Game Culture*, 3(1), pp. 9-22.

Nelson, H.L. (2001). *Damaged Identities: Narrative Repair*. Ithaca, New York: Cornell University Press.

National Research Council. (1988). *Understanding agriculture: new directions for education*. National Academy Press. Washington DC.

Ochs, E., & Capps, L. (2001). *Living Narrative: Creating Lives in Everyday Storytelling*. Cambridge: Harvard University Press.

Ogerchock, P.R., & Cottrell, S. (2004). The pediatric board game. *Medical Teacher*, 26(6), pp. 514-517.

Ollerenshaw, J.A., & Creswell, J.W. (2002). Narrative research: A comparison of two restorying data analysis approaches. *Qualitative Inquiry*, 8(3), pp. 329-347.

Peachey, A., & Childs, M. (2011). Virtual worlds and identity. In A. Peachey & M. Childs (Eds.). *Reinventing Ourselves: Contemporary Concepts of Identity in Virtual Worlds*, (pp. 1-12). London: Springer-Verlag.

Pearce, C. (2005). Theory wars: An argument against arguments in the so-called ludology/narratology debate. In *DiGRA 2005: Changing Views: Worlds in Play*, Vancouver.

Pelletier, C. (2009). What education has to teach us about games and game play. In Willett, R., Robinson, M., & Marsh, J. (Eds). *Play, Creativity and Digital Cultures*. New York: Routledge.

Pense, S.L, & Leising, J.G. (2004). An assessment of food and fiber systems knowledge in selected Oklahoma high schools. *Journal of Agricultural Education*, 45(3), pp. 86-96.

Pivec M, Dziabenko O, Schinnerl I. 2003. Aspects of Game Based Learning. Proceedings of I-KNOW 03

Prensky, M. (2001). *Digital Game-Based Learning*. New York: McGraw-Hill.

Quick, J.M., & Atkinson, R.K. (2011). A data-driven taxonomy of undergraduate student videogame enjoyment. In Steinkuehler, C., Martin, C., Ochsner, A. (Eds.). *Games + Learning + Society Conference Proceedings*, pp. 185-190.

Reynolds, M. (1997). Learning styles: a critique. *Management Learning*, 28(2), pp. 115-

133.

Rick, J., DeVane, B., Clegg, T., Peters, V.L., Songer, N.B., Goldman, S.R., Hmelo-Silver, C.E. (2012). Learning as identity formation: Implications for Design, Research, and Practice. In van Aalst, J., Thompson, K., Jacobson, M.J., Reimann, P. (Eds.). *The Future of Learning: Proceedings of the 10th International Conference of the Learning Sciences (ICLS 2012) – Volume 2, Short Papers, Symposia, and Abstracts*. International Society of the Learning Sciences: Sydney, NSW, Australia. pp. 126-133.

Rieber, L.P, & Noah, D. (2008). Games, simulations, and visual metaphors in education: Antagonism between enjoyment and learning. *Educational Media International*, 45(2), pp. 77-92.

Riessman, C.R. (2008). *Narrative Methods for the Human Sciences*, California: Sage Publications.

Seymour, E.S & Hewitt, N.M. (2000). *Talking About Leaving: Why Undergraduates Leave the Sciences*. Boulder, Colorado: Westview Press.

Sfard, A. & Prusak, A. (2005). Telling identities: In search of an analytic tool for investigating learning as a culturally shaped activity. *Educational Researcher*, 34(4), pp. 14-22.

Shaffer, D.W. (2004). Pedagogical praxis: The professions as models for postindustrial education. *Teachers College Record*, 106(7), pp. 1401-1421.

Shaffer, D.W. (2005). Epistemic games. *Innovate*, 1(6).

Shaffer, D.W. (2006). Epistemic frames for epistemic games. *Computers & Education*, 46, pp. 223-234.

Shaffer, D.W., Halverson, R., Squire, K.R., & Gee, J.P. (2005) Video games and the future of learning. *WCER Working Paper No. 2005-4*. Madison, Wisconsin.

Squire, K. (2003). Video games in education. *Computers in Entertainment*, 2(1), pp. 10.

Squire, K. (2005). Changing the Game: What Happens When Video Games Enter the Classroom? *Innovate,* 1(6).

Squire, K. (2006). From content to context: Videogames as designed experiences. *Educational Researcher*, 35(8), pp. 19-29.

Squire, K.D. (2008). Video game-based learning: An emerging paradigm for instruction.

Performance Improvement Quarterly, 21(2), pp.7-36.

Squire, K. & Jenkins, H. (2003). Card's prophesy: Imagining the future in Ender's Game. *Insight*, 3(7), pp. 5-33.

Squire, K. & Steinkuehler, C. (2005). Meet the gamers: They research, teach, learn, and collaborate. So far, without libraries. *Library Journal*, April 15, pp. 3-5.

Steinkuehler, C. (2006). Massively multiplayer online video gaming as participation in a discourse. *Mind, Culture, and Activity*, 13(1), pp. 38-52.

Steinkuehler, C. (2008). Cognition and literacy in massively multiplayer online games. *Handbook of Research on New Literacies*, pp. 1-38.

Steinkuehler, C. & Duncan, S. (2008). Scientific habits of mind in virtual worlds. *Journal of Science Education and Technology*, 17(6), pp. 530-543.

Steinkuehler, C.A., & Williams, D. (2006). Where everyone knows your (screen) name: Online games as "third places." *Journal of Computer-Mediated Communication*, 11, pp. 885-909.

Sulzman EW. 2004. Games in an introductory soil science course: a novel way for increasing student involvement with course material. Journal of Natural Resources and Life Sciences Education.

Sustainable Agriculture, Retrieved Dec 7, 2013 from http://agroecology.wisc.edu/

Tannen, D. (2007). *Talking Voices: Repetition, Dialogue, and Imagery in Conversational Discourse: Studies in Interactional Sociolinguistics*. Cambridge: Cambridge University Press.

VARK: A Guide to Learning Styles, Retrieved Dec 1, 2013 from vark-learn.com

Webster, L. & Mertova, P. (2007). *Using Narrative Inquiry as a Research Method: An Introduction to Using Critical Event Narrative Analysis in Research on Learning and Teaching*. New York: Routledge.

Wouters, P., van Nimwegen, C., van Oostendorp, H., & van der Spek, E.D. (2013). A meta-analysis of the cognitive and motivational effects of serious games. *Journal of Educational Psychology*, 105(2), pp. 249-265.

Yee, N. *The Proteus Effect: Modification of Social Behaviors via Transformations of Digital Self-Representation.* Diss. Standford University, 2007.

Zagal, J.P., Rick, J., His., I. (2006). Collaborative games: Lessons learned from board games. *Simulation & Gaming*, 37(1), pp. 24-40.

The End