

Virtual Economies as Financial Literacy Sandboxes: Case Study in Gaia Online

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## **Dedication**

This dissertation is dedicated to the most supportive guild in any world – my family.

## Abstract

Currently, our global economy faces numerous challenges that have adverse effects at every level, impacting both multi-national businesses and the average consumer. A recent report from the Presidential Advisory Council on Financial Literacy (PACFL) strongly linked the recent and continuing economic downturn with a need to improve the financial skills of people in the United States. Unfortunately, financial literacy among people in the United States is generally poor. This is partially because few states require financial literacy education among high school students but also because most financial literacy courses are ineffective. Courses that show learning gains often include experiential learning methods. This five-year single case study of a teen-aged business owner in the virtual world *Gaia Online* investigates how development of a business in a virtual world can facilitate informal experiential learning and the development of financial literacy among teen and young adult business owners.

A specific set of subject domains and a model of types of understanding are used to evaluate financial literacy manifest by the case study participant and evaluate the potential overlap of the financial literacy affordances of *Gaia Online* with definitions used in the literature and computer games used to teach financial literacy in school and community programs. With the exception of credit and insurance, the case study participant evidenced understanding of standard financial literacy domains. Based on the experiences of the case study participant, this study proposes expanding the subject domains to include property, especially intellectual property. The model of

understandings is also modified to separate specialized language from conceptual knowledge of financial literacy.

The study also explored experiences that encouraged learning. Changes in the business' status quo, positive or negative, caused the case study participant to seek out advice or resources to help her learn in order to adapt to the changes. This high-commitment, low-stakes environment mirrored the real world economy sufficiently to allow the participant to bridge between virtual experiences and real world formal learning and financial management. Over time, the participant's confidence in managing her virtual business and real life finances increased, and adopted an identity as a financially literate person.

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## **Chapter One – Introduction**

Currently, our global economy faces numerous challenges that have adverse effects at every level, impacting both multi-national businesses and the average consumer. Mainstream news reports frequently feature accounts of declining values of assets from corporate portfolios to retirement accounts, rising national and personal debt, corporate and family bankruptcies, sub-prime mortgage disasters, and rising unemployment ("Hot Docs: How the Financial Crisis Began, Unemployment Predicted to Rise in Developed Countries," 2008; Liu, Morarity, Franklin, & Shelor, 2009). While there was hope in the summer of 2009 that the United States would soon pull out of its recession, the economic conditions have not improved significantly over the past few years (Evans, 2011; Rich, 2012).

### **Our Financial Crisis**

Even before the recent recession began in 2007 (Reinhart & Rogoff, 2009; National Bureau of Economic Research, 2010), financial literacy experts were noting alarming financial trends in the United States. High debt burdens, both at the consumer (Fox, Bartholomae & Lee, 2005) and national levels (Reinhart & Rogoff, 2009) coincided with low savings rates. Personal savings rates continued to decline (Fox et al., 2005), particularly for retirement (Lusardi, 2008) but also for college or even to build up assets as a cushion in case their income stream was interrupted. In fact savings rates fell to nearly zero in 2005 (Board of Governors of the Federal Reserve System, 2011). All the while, there has been an increase in home foreclosures (Palmer, 2008) as the result of

the housing bubble's burst ("Hot Docs: How the Financial Crisis Began, Unemployment Predicted to Rise in Developed Countries," 2008), high bankruptcy rates (Fox et al., 2005), and a general lack of confidence in the financial system. All of these factors are part of the "The Great Recession" or "Second Great Contraction" - the financial crisis of the late 2000s (Donnini, Miller, & Walker, 2011; Reinhart & Rogoff, 2009). There is a growing awareness not only among policy makers but the general public as well that we are in a financially vulnerable period (Way & Wong, 2010).

### **Need for Financial Literacy**

A recent report from the Presidential Advisory Council on Financial Literacy (PACFL) strongly linked the recent and continuing economic downturn with a need to improve the financial skills of people in the United States: "We believe the market turmoil and credit crisis of 2008 underscore the critical need for improved financial literacy in the United States. While there are many causes to the economic problems facing the country, it is undeniable that a lack of financial literacy is a contributing factor" (Presidential Advisory Council on Financial Literacy, 2009, p. 2). A large portion of the recent global economic expansion was due to the increasing volume of consumer spending, leveraged on consumer debt (Donnini et al., 2011; Liu et al., 2009) and the increase of housing sales was partially due to sub-prime mortgages that were marketed to people with less income, lower general education, and limited financial literacy (Mandell, 2009).

It has been noted that poor financial decision-making is remarkably widespread (Hung, Parker, & Yoong, 2009), affecting people throughout the socio-economic status

spectrum, including both high- and low-income families (Donnini et al., 2011). PACFL Chairman Charles Schwab, of the financial services company Charles Schwab Corporation, has noted that even the most affluent people can lack the knowledge and skills needed to make sound financial choices (Grody, Grody, Kromann, & Sutliff, 2008). While different people need to make different choices at various stages of their life (Milevsky, 2010), everyone needs to understand how to make effective financial choices.

Arguably, society as a whole has a vested interest in increasing the ability of all people to make informed financial decisions to ensure their own personal financial health as well as to protect the economy of the nation and the world (Donnini et al., 2011; Koehler, Lawroski, & Bischoff, 1995; McClenaghan & Aslam, 2009). This is an issue that goes beyond mere consumerist interests. It is important to educate people to manage their personal financial decisions and to prepare them to understand and influence national and local economic policy decisions. The economy is becoming increasingly complex (Palmer, 2008), and people need to be able to analyze financial information in order to make unfamiliar decisions, both personal and political. Many consumers now have greater choice in how they borrow or invest money (Hung, Parker, & Yoong, 2009). Political debates and election campaigns often revolve around financial issues ranging from decisions about the funding of local school building plans to whether or not to privatize Social Security. Although policy makers, social justice advocates, and educators have differing opinions regarding how and when to introduce financial literacy education in the lives of U.S. citizens, most agree that, on both small and large scales, financial literacy is a necessity for all in the 21st century (President's Advisory Council

on Financial Literacy, 2009).

### **What is Financial Literacy?**

The term “financial literacy education” has been used to describe a wide variety of educational programs and research efforts without a consistent understanding of what concepts, skills, and behaviors are covered under this umbrella (President’s Advisory Council on Financial Literacy, 2009). Hence, one of the Council’s recommendations was to establish a standard definition of financial literacy that can be used to guide the development and assessment of financial literacy educational programs. The Council has suggested that *financial literacy* be defined as “the ability to use knowledge and skills to manage financial resources effectively for a lifetime of financial well-being” (President’s Advisory Council on Financial Literacy, 2009, p. 37) and they define *financial education* as “the process by which people improve their understanding of financial products, services and concepts, so they are empowered to make informed choices, avoid pitfalls, know where to go for help and take other actions to improve their present and long-term financial well-being” (President’s Advisory Council on Financial Literacy, 2009, p. 37). Notice that financial literacy involves both an understanding of concepts as well as the ability to use those concepts in daily life.

The definition of President’s Advisory Council on Financial Literacy (PACFL) establishes a “consensus definition” (Hung, Parker, & Yoong, 2009, p. 4) of financial literacy that is sufficiently broad to incorporate the wide range of educational programs and initiatives developed by schools, non-profit, and for-profit organizations. The all-encompassing nature of this definition, however, hides the extensive range of individual

subjects and types of understanding addressed over the decades by various educational materials and programs. A broader discussion of the current and historical definitions of financial literacy will be undertaken in Chapter Two.

### **Financial Illiteracy**

Unfortunately, financial literacy among people in the United States is generally poor (Donnini et al., 2011). The 2009 report from the Jump\$tart Coalition for Personal Financial Literacy lays out disturbing statistics on the lack of financial literacy of high school students and young adults, most of whom do not grasp basic concepts needed to make financial decisions that will affect their standard of living in a few short years (Koehler et al., 1995; Mandell, 2009; Palmer, 2008). The Jump\$tart Coalition tests a sample of high school youth every two years, asking basic, practical money-management questions. In 1997/1998 the results of the benchmark administration of the survey were very poor (57.3%), indicating that the majority of the respondents were unable to achieve a passing grade in basic financial literacy concepts. At the time, the Coalition was confident that the scores would improve over the next 10 years. However, the situation has not improved. Scores declined from the “failing” level of 1997/1998 every year, finally reaching the lowest scores in the 2008 survey, nearly 10 percentage points behind the 1997/1998 scores. In short, the situation had been dire in the 1990s (Koehler et al., 1995) but has been steadily getting worse over the past decade (Mandell, 2009). While this report noted that scores increase with the number of years of college education, Mandell also noted that those who have the least overall education and financial resources are also least likely to be financially literate, unable to use what little income



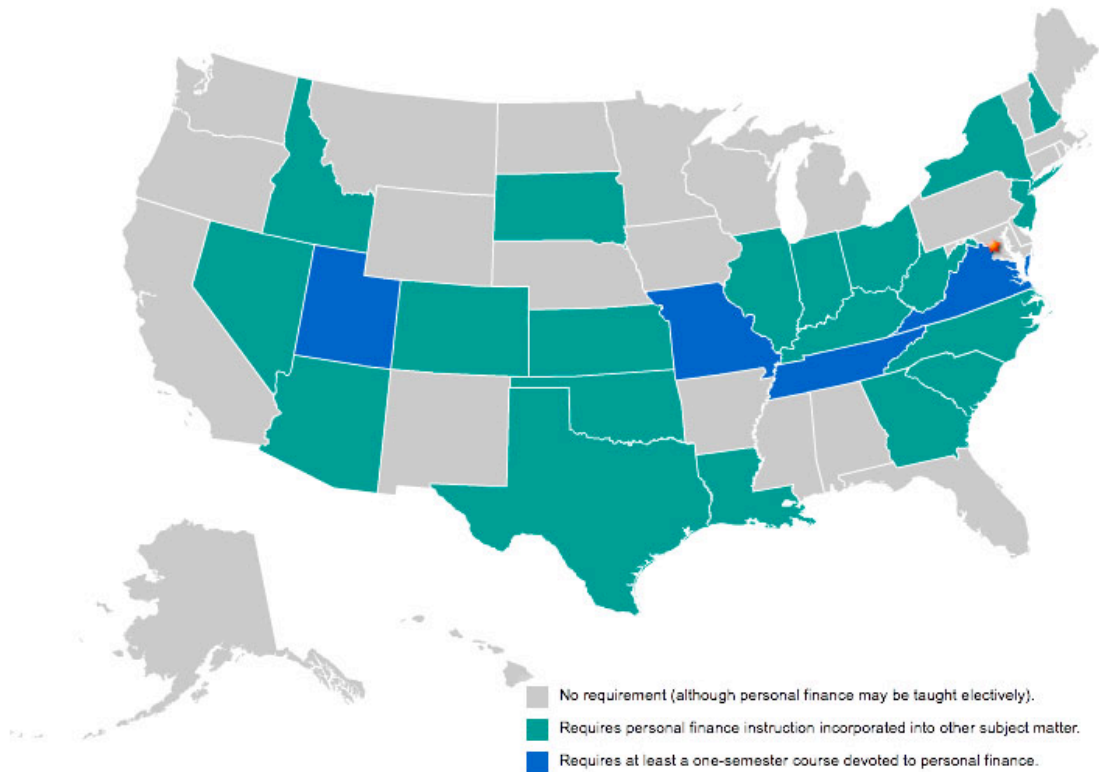
and assets they possess efficiently. Given that only 28% of U.S. citizens graduate from college (Mandell, 2009, pp. 8 - 9), this means that the majority of U.S. citizens will be unprepared for the complex financial world we live in.

### **Financial Literacy Education**

The combination of economic crisis and the recognition of our lack of understanding of financial management skills has reinvigorated efforts to increase the financial literacy of U.S. citizens through various programs by setting standards, especially in K-12, and creating opportunities for effective financial literacy training (Cole & Fernando, 2008). In 2008, President Bush, for instance, established the Advisory Council on Financial Literacy to investigate how to improve financial education for people from all backgrounds (Grody et al., 2008). Of their five recommendations, three involve formal education: requiring financial education in K-12 schools, requiring college students receiving federal loans to take a course in financial literacy, and giving tax incentives to employers who provide courses to their employees (Palmer, 2009).

Since few states have a requirement for a finance-related class in high school, such recommendations sound promising. Only four states (Utah, Missouri, Tennessee, and Virginia) require a semester-long course in personal finance. An additional 21 states require that personal finance be included in other courses (JumpStart Coalition for Personal Financial Literacy, 2011). Thus, only half of the states in the U.S. require personal finance instruction. The result is that, according to surveys in 2006 and 2007 by the Hartford Financial Services Group and Capital One (“Making the Case for Financial

Literacy - 2007", 2007), most students want to learn about money management but very



**Figure 1: Map of the State Financial Literacy Requirements. Source: Jump\$tart Coalition for Personal Financial Literacy (2012)**

few have a class on that topic (Lai, Brookshire, & Ma, 2004; Liu et al., 2009). Some of the need for financial literacy education is met by community organizations, extension, businesses, faith-based organizations, community colleges, and the military. Outside of public schools, in 2005, there were 90 financial education programs, 75% of which had been founded in the 1990s or in 2000. Their frameworks and quality of instruction varied widely (Fox et al., 2005).

A minority of theorists questions not only the effectiveness of current efforts but also doubts the possibility of creating effective financial literacy educational programs for the general population (Palmer, 2008). Proponents of this view point out that our

financial world is growing rapidly more complex. Consumers are offered an increasing range of choices for both borrowing and investing money in a financial product marketplace glittering with free-market, non-standard choices that they have not been trained to understand. The average middle-class U.S. citizen now has easy access to credit through credit cards, alternate mortgage providers, and car loan brokers associated with the auto industry, as well as traditional bank and credit unions. On the other end of personal financial management, many U.S. citizens now must decide how to invest their own retirement funds, even in company-sponsored programs, and juggle a variety of options for saving for their children's college expenses. Given the pace at which new financial products are developed and marketed, authors such as Lauren E. Willis of Loyola Law School argue that financial literacy education programs could not keep pace, and consumers would need constant re-education in order to cope with new options and choices. Additionally, research has shown that, even when people have accurate information, they do not always enact beneficial behaviors (Way & Wong, 2010), in part because of highly effective advertising designed to encourage consumer spending and debt (DeTar, 2009). Given this situation, these theorists argue that financial education only increases false confidence in the people who think they are empowered to make effective decisions and deflects focus from the real necessity, which is increased financial market regulation (Willis, 2008a; Willis, 2008b) or the creation of tools that help consumers manage daily spending decisions (DeTar, 2009). To be most effective, both an increase in effective financial education offerings and increased consumer protection regulation may be required to improve the financial health of U.S. consumers.

## Poor Results of Current Education Programs

Unfortunately, current financial literacy programs are largely ineffective despite more than a decade of programs aimed at increasing financial literacy, especially among teens and young adults. Mandell's 2009 report shows that students who take a high school course in personal finance do not tend to do better on the Jump\$tart Coalition's biennial survey than those who have not had a high school personal finance course (see Figure 2), and Cole and Fernando (2008) reported that the case for increasing formal financial literacy education is not strong.

	1997	2000	2002	2004	2006	2008
Overall mean	57.3%	51.9%	50.2%	52.3%	52.4%	48.3%
Full PF		51.4	48.2	53.5	51.6	47.5
Part PF		52.9	49.8	52.7	53.4	48.9
Full Econ		51.0	49.8	53.0	53.2	48.8
Part		52.1	51.1	53.2	53.0	49.4
SMG		55.1	52.4	55.8	55.0	51.0

**Figure 2: Comparison of scores of students who have taken personal finance course, economics courses, or played the Stock Market Game versus the overall mean. Data from Mandell, L. (2009). The Financial Literacy of Young American Adults: Results from the 2008 National Jump\$tart Coalition Survey of High School Seniors and College Students.**

The reasons why financial literacy programs do not have a stronger effect upon scores is currently the subject for debate even as a new flurry of programs is being introduced (Palmer, 2008). Grody, Grody, Kromann, and Sutliff (2008) have pointed out that teaching concepts such as the importance of saving is only part of the process. Even when experiential learning methods are used, providing students the social link to financial institutions is often missing. So, while students understand the concept and are

able to practice it in a learning environment, they lack the final step, which is legitimate participation in authentic practice. Mandell (2009) has also observed that high school students who take a personal finance course early in their high school career may lack experience with real life financial decisions, which may negatively impact their motivation and retention of finance concepts.

### **Improving Effectiveness of Financial Literacy Education Programs**

There is room for hope that financial literacy education can succeed, however. Experiential and game-like elements seem to improve the effectiveness of formal financial literacy programs. Mandell's report noted a significant performance increase when a stock market game has been incorporated into the class (2009), students who played *MoneyU* out performed peers on financial literacy tests (Ash, 2009), and students who complete a curriculum incorporating simulations report adoption of successful behaviors after they complete the program (Bateson, 2009). Other researchers have begun piloting immersive, online games to test virtual worlds as a financial literacy educational tool. Creations such as the *Credit Union Island Financial Literacy Game* in *Second Life* (Liu et al., 2009) and the *Wells Fargo Stagecoach Island* (originally in the virtual world of *Second Life* but now incorporated directly into the Wells Fargo company website) build on the theory that online games and virtual worlds (also known as multi-user virtual environments) are extremely popular across a broad range of people, most especially among students and young adults. Using these as a vehicle for education may be successful because they provide engaging ways for students to experiment with behaviors in a low-risk environment (Liu et al., 2009) or provide opportunities for

competition and interaction with peers (Donnini et al., 2011) while being entertaining enough to hold their attention.

### **Experiential Learning in Financial Education**

Colloquially known as *learning by doing* (Inman, Wright, & Hartman, 2010; Mann & Norris-Reeves, 2008), Kolb's experiential learning is formally defined as "the process whereby knowledge is created through the transformation of experience" (Kolb, 1984 as cited by Jarmon, Traphagan, Mayrath, & Trivedi, 2009, p. 170). Experiential learners develop their understanding through four, usually sequential, steps: concrete experience, reflective observation on that experience, abstract conceptualization based on the reflection, and active experimentation which leads to further gathering of experiences, restarting the cycle (Jarmon et al., 2009; Koehler et al., 1995). When educators use experiential learning methods, they often create situations and tasks in which learners interact with each other and their environment, often to complete a project (Inman et al., 2010). It is a type of learning that makes use of action and experimentation in progressive steps, paired with educators as facilitators who scaffold learners to make sense of and learn from their experiences (Jarmon et al., 2009). Experiential learning can be a valuable method for teaching financial literacy for a variety of reasons.

Experiential learning methods appeal to different types of students and help level the educational experience. When teaching consumer economics in the 1990s, Koehler, Lawroski, and Bischoff found that non-traditional students with different socio-economic and ethnic backgrounds and those with different learning preferences were more engaged and successful students if experiential learning methods were incorporated into the class

(1995). As they reported, “Non-traditional students who are accustomed to failure, feel they will also fail the consumer economics class but when activities and games are utilized, they find out consumer economics isn't rocket science, and they become excited because they can learn” (Koehler et al., 1995, p. 43). In similar business and finance classes, students who did not fit with “traditional book learning methods” (Bliermell, Glave, & Logue, 2010, p. 13) were found to be more successful when experiential learning was introduced into their class (McClenaghan & Aslam, 2009). This effect generally is strongest for lower GPA students who tend to improve more when games or hands-on approaches are used in teaching (Philpot & Peterson, 1998).

This result may be, in part, because experiential learning appeals generally to a wide variety of learners. Some educators adopt experiential learning in order to appeal to the current generation of students who they see as accustomed to different media, prefer to learn through a variety of channels, and are more likely to want a participatory role in their learning (Friel, et al., 2009; Jarmon et al., 2009; Howe, Strauss, & Matson, 2000; Mann & Norris-Reeves, 2008; Tapscott, 1998; Tenofsky, 2005). In the 1990s, some educators began turning to experiential learning specifically as a “useful way to reach ‘today’s teens’ who were raised on MTV and media” (Koehler et al., 1995, p. 43). However, other educators view experiential learning simply as an engaging, motivating, and natural learning method that appeals to a wide range of learners (Gee, 2003; Toro-Tronconis et al., 2008).

By providing concrete experience, experiential learning can help make complex, abstract, and “dry” concepts easier to understand (Philpot & Peterson, 1998). Economics

and finance are fields in which “the concepts to be learnt are abstract and do not correspond directly to material objects” (Dalgarno & Lee, 2010, p. 19). As Diana Oblinger observed, “It is hard to understand something without direct experience” (2006a, p. 1), and many concepts in personal finance, such as compound interest, are both difficult to understand and out of the realm of experience for many high school and college students. Without experience to make the information relevant (Koehler et al., 1995), the teaching of financial concepts does not seem to encourage long-term retention (Grody et al., 2008). In financial literacy education, the experiential component may help bridge the observed gap between knowing financial concepts through education and the ability to put them into practice, a key component in financial literacy (Hogarth, 2006; President’s Advisory Council on Financial Literacy, 2009).

### **Experiential Learning in Virtual Worlds**

Studies have show that virtual worlds can be effective sites for experiential learning (Dede, 1995; Inman et al., 2010; Jarmon et al., 2009). These worlds allow learners to gain experiences and engage in active experimentation, especially when used with project-based learning methods that involve collaboration and interaction across geographical boundaries (Jarmon et al., 2009). Virtual worlds in themselves are highly interactive and allow learners to incorporate a variety of performative elements such as narrative and story telling, improvisation and role-play, as well as creation and design of experiences for others (Jarmon et al., 2009). When used by educators, activities can also be designed to follow progressive steps of increasing difficulty to encourage learning and



reflection based on dynamic feedback from the environment (Bloomfield, 2009; Jarmon et al., 2009).

In some situations, the virtual world can be used to facilitate educational experiences that would be difficult, expensive, or impossible to provide in the real world (Dalgarno & Lee, 2010; Jarmon et al., 2009; McClenaghan & Aslam, 2009, Pereira, Martins, Morgado, & Fonseca, 2009). As an example, some educators have taught experimental building design courses where examples are constructed in a virtual world such as *Second Life* and opened up to the general public. To create these in real life would be beyond the capacity of a university course, but they are feasible in virtual reality (Jarmon et al., 2009; Thomas & Hollander, 2010). In other cases, the virtual world allows educators to create representations of phenomena that do not have a tangible form or take place at a scale not accessible to human perception, being too small, too large, too slow or too fast for us to apprehend (Chen, Wu, Li, & Chan, 2010; Dalgarno & Lee, 2010; Ozercan, 2010; Pereira et al., 2009).

Additionally, virtual worlds allow for social experimentation, especially the role-play or simulation of real world professional tasks in a safe environment. In many fields, students in professional programs such as medicine, law enforcement, business, aeronautics, and the military use role-play as part of their training. Virtual worlds can and have been used to provide these learners with simulated, immersive sites in which to practice their skills without associated risks of injury to themselves or others (e.g., Bloomfield, 2009; Gerald & Antonacci, 2009; Horton, Davenport, Hall & Rosenbaum, 2002; Hudson & Degast-Kennedy, 2009; Lai et al., 2004; Liu et al., 2009; Toro-Troconis

et al., 2008). Virtual world installations can also be used to provide visitors with simulated experiences that would not normally be ethical outside of a virtual simulation, such as the experience of medical apartheid or being a prisoner (Sancton, 2008).

Although these situations sound disconnected from the real world experiences, researchers argue that the distinction between play-acting and acting becomes blurred in immersive virtual worlds, and virtual world experiences have a direct relationship to understanding and meeting the challenges and reality of enacting these skills outside of the simulation (Jarmon et al., 2009). For some researchers in business and finance education, allowing virtual participants to take on roles in virtual business settings allows them to “understand factory floors and trading floors, supply chains for potato chips and computer chips, marketing strategy, and ... how financial reporting regulations affect capital flows and financial markets” (Bloomfield, 2009, p. 4). Since the economy is itself so intangible, use of virtual worlds in finance and business education may provide the experiential context needed to understand many of the abstract and difficult concepts (Chen et al., 2010; Hornik & Thornburg, 2010).

### **Game-Like Elements in Financial Literacy Education**

The potential for virtual worlds as platforms for financial literacy education may be increased by the incorporation of game-like elements. Reports have indicated that students who play the *Stock Market Game* have a significant improvement in math and financial literacy (Harter & Harter, 2010; Hinojosa et al., 2010; Mandell, 2006; Mandell, 2009). “This implies that classes which are interactive, relevant, and fun may be more effective than those that are purely didactic” (Mandell & Schmidt Klein, 2009, p. 23).

Educators who use experiential learning for teaching financial literacy explain that games help motivate students and maintain their interest in a topic that can be considered dull, which helps to increase their retention of the material and provide context (Koehler et al., 1995).

A number of organizations are attempting to take advantage of the power of play and games to engage potential learners in financial literacy education. These include banks, such as Wells Fargo (Wells Fargo Introduces Stagecoach Island - Industry's First Virtual Reality Online Game to Help Young Adults with Financial Literacy, 2005), credit card providers, such as Visa (LA Galaxy's Landon Donovan and Visa Collaborate to Create 'Financial Soccer' - Free, Educational Video Game, 2010; Torry Holt, Josh Brown Join Treasurer Steelman, Chase, Visa for Statewide Launch of 'Financial Football', 2008), and non-profit organizations, such as Doorways to Dreams (Osuri, 2011a). Generally, these online games are designed to teach single financial literacy concept, such as *FarmBlitz*, a game designed to encourage savings (Osuri, 2011b). While reports show that people are playing these games, it is not yet clear how many succeed in creating lasting educational benefits (Osuri, 2011a). However, some studies are showing positive results among college-aged students whose credit behavior can be monitored after participation in online credit responsibility training that incorporates games (Donnini et al., 2011).

### **Importance Of Developing Situated Skills And Habits**

Simply asking learners to play financial literacy games or participate in virtual worlds may not be sufficient to ensure learning. Experiential learning theory requires

that learners not only have experiences but also to process those experiences through reflection and conceptualization (Koehler et al., 1995). Hammer and Black observed, after studying how expert game players of *Civilization* and *SimCity* performed in history and urban planning classrooms respectively, that learning academic content requires “some kind of formal structure ... to help students make sense of their learning experiences in the game” (2009, p. 31). When it comes to financial literacy education, the final step in experiential learning, active experimentation, is also extremely important. Players of financial literacy games need to bridge the gap between applying any knowledge they gain from playing to adopting behaviors and habits associated with financial literacy (Osuri, 2011a). This is a step that has not been addressed adequately in studies on financial literacy education thus far (Way & Wong, 2010). As was noted in the President’s Advisory Council on Financial Literacy Report, “ ... currently, there are limited resources within the financial literacy arena that integrate everyday routines as learning moments.” (2009, p. 23). In order to achieve the aims of increasing financial literacy *behaviors*, an essential component in financial literacy education, educators must find a way to help learners develop new financial skills and put them into practice.

### **Virtual Businesses as Experiential Learning Sites**

Virtual experiential learning environments have been seen to foster real life application of skills and concepts, especially when the focus has been on project-based learning. Jarmon et al. (2009) found that the virtual world of *Second Life* could be used as a catalyst for developing real life applications of course information through experiential learning methods. Their students’ projects in developing model homes

engaged them in the experiential learning cycle tasks and online collaborations that resulted in transferable skills. “SL was, in effect, a world where, through experiential learning students could exercise their imaginations, create projects that had never existed in the real world, and apply their innovative thinking in ways that mattered to them and to others in the real world” (Jarmon et al., 2009, p. 180).

Few real-life experiences correlate to higher financial literacy among young people (teens and college students) with the exception of earning money (Mandell, 2009). Hence, it might be helpful to engage learners in a virtual world project where they earn the local currency. Employment *per se* is rare in virtual worlds (although it does occur in *Second Life*), but running a virtual business or developing disciplined and habitual ways of earning virtual currency is a common practice in virtual worlds and online entertainment games. Two prior studies positioned students as business creators and managers in order to facilitate the development of personal financial literacy (Horton et al., 2002; Pereira et al., 2009). Since virtual worlds and online games often involve some type of economy in order to facilitate the exchange of virtual goods and services necessary to the game (Bloomfield, 2009; Castronova, 2001), many of these worlds also implicitly offer opportunities for experiential learning of finance skills and concepts. Even when digital games and virtual worlds are not used in formal, financial literacy learning situations, they may provide a foundation for later, formal learning experiences (Hammer & Black, 2009).

Virtual worlds, and virtual businesses, also provide an environment in which learners are free to experiment and test innovative solutions (Horton et al., 2002).

“Virtual worlds are engines for innovation and collaboration. This makes them wonderful venues for the study of real world businesses, which are themselves engines of innovation and collaboration” (Bloomfield, 2009, p. 5). They are also environments where the cost of experimentation is generally very low. Virtual business owners can often make changes in their product or the appearance of their storefront quickly and for free and, sit back to observe the results, assess the success of their experimentation, and then make further changes if needed (Pereira et al., 2009).

### **Study Objective and Research Question**

Therefore, it is important to examine what, if any, skills and financial concepts virtual world business owners develop as they engage in self-directed engagement with project-based, experiential learning. Researchers have noted that relevance to the learner also has a positive influence on learning. “[S]tudents of [financial literacy] classes do better if they are properly motivated to understand why personal financial management is important to their futures. Thus, future research should focus on whether the effectiveness of such classes can be materially improved through interactivity, currency, enjoyment, and motivation” (Mandell & Schmidt Klein, 2009, p. 23).

**Study objective.** The objective of the study is to document how the creation and management of a virtual business in a role-playing environment of a virtual world can support experiential financial literacy learning. Using a virtual world entrepreneur as a case study, this naturalistic, phenomenological study will document the case study participant’s experiences in learning to be a business owner in the multi-user virtual environment *Gaia Online*.

**Research question.** Specifically, this study will address the question: How does the development of a business in a virtual world facilitate the development of financial literacy among teen and young adult business owners?

Sub-questions that will help frame the inquiry are:

- What does it mean to be financially literate in *Gaia Online*?
- How does financial literacy in *Gaia Online* relate to other definitions of financial literacy?
- What business challenges trigger learning episodes in the virtual world?
- What concepts do virtual business owners use to frame their business activities and decisions?
- How do virtual business owners reflect upon and learn from their virtual world experience?
- How does experience in a virtual economy influence their confidence in managing personal finances?
- How does experience in a virtual economy influence their development of identity as a financially literate person?

### **Significance of the Study**

Little is known about the role computer games and simulations play in financial literacy learning, especially games which involve multiple players (Jones & Chang, 2012). Some studies have suggested that students have greater retention of concepts and skills from finance courses that incorporated ludic pedagogy aspects such as playing a stock market game (Mandell, 2009). Also, Rebecca Black's work on fan fiction as a

way to encourage text literacy has suggested that “interactional features, such as informal mentoring, active learning, shared spaces for novices and experts, distributed sources of knowledge, recognition of a wide range of expertise, and the incorporation of user input, are aligned with social constructionist approaches to learning and potentially could be integrated into planning for classroom activities in ways that youth might find motivating and meaningful” (Black, 2008, Conclusion, para. 1). Similarly, virtual worlds centered on production and selling of art could incorporate features useful in creating engaging learning spaces in which students can learn personal and business finance principles.

This study may suggest ways that financial literacy development can be assessed through analysis of successful performance of tasks embedded in the learning environment. If the skills and knowledge required to be successful in running a virtual business align with those required to manage money in the standard economy, we may be able to expand financial literacy assessment strategies to incorporate situated performance. Currently, assessment of financial literacy relies heavily upon decontextualized computation and explanation of concepts, especially via multiple-choice or fill-in-the blank tests. The study of virtual worlds as sites of authentic performance assessment could lead to educational multiplayer learning environments for finance similar to those designed for science, such as *Quest Atlantis* (Barab, Thomas, Dodge, Carteaux, & Tuzu, 2005; Lim, Nonis, & Hedberg, 2006; Young, Schrader, & Zheng, 2006) and River City (Kao, Galas, & Kafai, 2005).



## Definitions

In order to facilitate understanding and avoid confusion, some terms are defined here, for purposes of this study. These definitions are not definitive and may deviate from definitions other computer game and virtual world researchers would propose.

**Casual games.** Casual games are computer or video games that typically are easy and take little time to play, requiring very little commitment on the part of the player. They are usually playable in short bursts of fewer than 20 minutes. The ubiquitous computer game *Solitaire* is an example of a casual game.

**Computer game.** A computer game is a game that is played using a general-purpose computer. While definitions vary, a computer game generally has a specified goal, such as getting all the cards into four stacks organized by suit and sorted by order in *Solitaire*, rules, and roles for each player. In a computer game, the computer can simulate the actions of one or more other players, such as in a computerized chess game.

There is a very wide range of computer games. Games can be played by a single player or can involve thousands of players in an online multiplayer game such as *World of Warcraft*. Computer games also range in complexity from simple games such as *Solitaire* to complex games that can take 60 hours or more to complete. Some games are never be “done” in any meaningful sense (see definitions of massively multiplayer online and sandbox games) since they have so many options and goals that a single player cannot possibly explore and complete them all.

Computer games can be contrasted with simulations and virtual worlds (see definitions below) because they have goals and may have scoring systems.

**Computer simulation.** A computer simulation is a computerized model of a system. Generally, it shows the interaction of variables according to programmed rules. It may be interactive, allowing a player to change the values of certain variables and allowing the simulation to show the results. Dynamic computer simulations for education differ from computer games in that there is no desired goal or scores for the player to achieve. However, the distinction between serious games and computer simulations can become quite blurry in cases such as flight simulators (such as Microsoft's *Flight Simulator X*), business simulations (like Sid Meier's *Railroad Tycoon*), and even classroom simulations (such as the University of Central Florida's STAR Classroom Simulator).

**Digital media.** Digital media is a broad category that includes computer games, simulations, and virtual worlds and also social networking and social media such as discussion forums and online sites such as *Facebook*. It also includes digital artifacts such as digital images, sounds, and animations.

**Informal learning.** There is no established definition of informal learning. It seems largely defined as intentional learning that takes place outside of the classroom but in support of classroom learning (Aspden & Thorpe, 2009; Chan et al., 2006; Hammer & Black, 2009; Jamieson, 2009; Strauss, 2002). Informal learning may take place with the assistance of institutional staff, but it usually does not involve the classroom teacher (Jamieson, 2009). It can occur in designed learning spaces (Brown, 2005; Jamieson, 2009) or in spontaneous interactions among individuals anywhere (Chan et al., 2006; Oblinger, 2006b). Informal learning may involve teaching activities, especially between

peers in affinity spaces (Gee & Hayes, 2009), but it more generally applies to activities such as “course reading, class preparation, and assignments and project activity” (Jamieson, 2009, p. 19). Although informal learning is not a new phenomenon, it has not been widely recognized as an important facet of learning until recently (Aspden & Thorpe, 2009; Jamieson, 2009).

**Mobile app.** A mobile app (short for “application”, which is a computer program) is a computer program that runs on a smartphone (such as an iPhone or Android), tablet computer (such as an iPad), or other portable device. Computer programs that run on a full-featured general-purpose laptop computer are usually excluded from this category.

**Massively multiplayer online games (MMOGs).** MMOGs are computer games played online in graphical (two- or three-dimensional) virtual locations that are also simultaneously occupied by many other people (sometimes tens of thousands) who are also playing the game and sharing experiences. Individual players interact with the game and each other via digital representations of themselves. These games typically are complex and open-ended, giving players a wide variety of game goals from which to choose and a suite of options of how to achieve those goals. MMOGs often incorporate a social element and can require cooperative and/or competitive play in order to achieve some large or long-term goals.

**Pro-Am.** The term “pro-am” refers to amateurs or hobbyists whose amateur activities approximate the work quality of professionals or experts (Leadbeater & Miller,

2004). Pro-ams operate in diverse arenas such as astronomy (Leadbeater, 2004), computer game development (Steinkueher & Johnson, 2009), and sports.

**Sandbox games.** A sandbox game is a computer game that is open-ended, where the player sets his or her own objectives and goals and determines how to achieve those ends. While the game may have designed rules and constraints, it also is sufficiently complex to allow players multiple paths to success, a state that is defined and evaluated by the player. Sandbox games also typically allow different players to have, potentially, very different experiences of the game and find different meanings and interpretations of what goes on in them (Squire, 2008; Williams, 2010).

Sandbox games stand in contrast to typical computer games where a player has a limited, predetermined sequence of moves (such as *Solitaire*). For example, the highly successful *Sims* series of games can be used to create stories, recreate historical sites, serve as a fashion designer's toolkit, and provide a platform for interior decorating practices (Hayes & King, 2009).

Extreme versions of sandbox games are actually virtual worlds or "sandbox spaces" (Williams, 2010, p. 5) in which rules are nearly non-existent. Each player (or resident, as they are often called) joins for unique reasons and finds sections of the game, or virtual world, which will cater to those reasons. Player behavior in these sandbox games is guided more by peer pressure than designed game elements, and players often use the spaces to socialize or to engage in experimentation and creative pursuits (Squire 2008).

**Smart phones.** A smart phone is a mobile- or cell-phone that incorporates features from other mobile devices and extends the functionality of the telephone to being a type of personal digital assistant as well as a telephone. Smart phones may incorporate media players (for music and video), digital cameras, calendar programs, and web browsers. Their features are often customizable, allowing the user to add mobile applications (see definition above) to meet the unique needs of the owner. The iPhone, Android, and the Blackberry are commonly known smart phones.

**Serious games.** This is a term used to distinguish computer games designed for education, activism, or research from computer games designed primarily as commercially sold entertainment. Serious games are meant to be as engaging and entertaining as their commercial counterparts, but the focus on serious purpose rather than success as a commercial venture separates them from the mainstream computer or video game.

**Virtual business.** A virtual business is one that operates exclusively in a virtual world or online computer game. It has no legal standing in any state or country, is not incorporated in any state or country, does not pay taxes, and does not trade in the currency issued by any recognized government. A virtual business is distinct from legally established businesses engaged in e-commerce that may trade in a virtual world using private, alternative currency.

**Virtual world.** A virtual world is a computer-simulated persistent environment (Liu et al., 2009) that is similar to the tangible world, although it can deviate from so-called real world physical constraints. Virtual worlds are populated by many concurrent

players (Bloomfield, 2009) who interact with the world and share common experiences with other players through virtual representations of themselves, which are called avatars (Liu et al., 2009). Communication between users is usually accomplished via typing and/or voice communication. In some virtual worlds, simulated body language, displayed on their in-world representation (avatar) can communicate simple ideas or emotions of the user.

These worlds differ from computer games in that participants (also called “users” or “residents”) are not given specific goals or objectives (Hornik & Thornburg, 2010), and there is no scoring mechanism or end state to pursue. Users usually are free to make complex decisions (Bloomfield, 2009) and have a wide range of options and activities they can pursue in a virtual world. Some virtual worlds, such as *Second Life* and *Active Worlds*, allow players to create objects in the world such as buildings, plants, and clothing. Other virtual worlds, such as *Gaia Online*, do not allow residents to create digital content in the world. The combination of player agency and the ability of average users to create digital media in a multiplayer environment make virtual worlds attractive sites in which educators and researchers can design interactive, digital learning experiences.

Modern virtual worlds are typically thought of as highly graphical (two- or three-dimensional), although some purely textual virtual worlds and those that combine text, still images, and two-dimensional animations continue to exist and thrive. *LambdaMOO*, one of the first and best known of these, is still an active virtual world today.

The distinction between computer games and virtual worlds can be difficult to understand, especially since some virtual worlds, such as *Second Life*, allow residents to create computer games within them. Other virtual worlds, such as *Gaia Online* promote their own in-world games like *ZOMG!*. Hence, the relationship is that virtual worlds can contain computer games, although it is not necessary.

## **Conclusion**

This chapter introduced the problem of financial illiteracy in the United States, exploring some of the impact it has on the health of the economy and the challenges encountered by efforts to improve the effectiveness of financial literacy education interventions in the classroom and in community-based programs. Some educators in this field have adopted experiential learning methods in order to improve student learning outcomes, adding computer games and virtual world simulations to increase student engagement, provide context, and encourage experimentation in safe settings.

Chapter Two will continue the evaluation of studies conducted by educators who use and design computer games for financial literacy education. Since financial literacy is a broad topic that is difficult to operationalize for comparison between different interventions and studies, this chapter will introduce a proposed framework of subject domains and a taxonomy of levels of understanding. The framework will guide examination and classification of the prior studies of computer games virtual worlds, and digital communication used in personal financial literacy education. The chapter will conclude with an evaluation of the results of the studies and a discussion of critical financial literacy themes explored by these researchers and designers.

Chapter Three will detail the design of this naturalistic case study. It will briefly introduce the setting of Gaia Online as the virtual world location of the study, the study participant, the position of the researcher as a participant observer, and describe in depth the data collection, protection, and analysis processes.

Chapter Four will begin with a detailed description of the case study location and participant. It will then present the findings of the case study, organized by research question and the financial literacy framework created in Chapter Two. It will conclude with a proposed revision to the subject domain portion of the framework and an exploration of how some of the critical financial literacy themes found in prior studies also appear in the data for this case study.

Finally, Chapter Five will commence with a description of two typical cases of informal learning through playing business. These stories will be used to frame the value of play activities as foundations for financial literacy and economics learning. This will lead into a discussion of the research question: how virtual worlds support financial literacy learning. The chapter will then conclude with a discussion of the study's limitations and opportunities for future research.



## **Chapter Two - Literature Review**

Before addressing the question of how the development of a business in a virtual world facilitates the development of financial literacy among teen and young adult business owners, one of the first tasks is to define financial literacy in detail so that it can be recognized with reliability when examining the practices of virtual business owners. The President's Advisory Council on Financial Literacy (PACFL) definitions of financial education and financial literacy are broad enough to be inclusive of the myriad existing educational standards, curricula, and programs and to allow development of new interventions along current trajectories, but they are difficult to operationalize for field observations. Hence, using definitions from financial literacy writers and studies of financial literacy education games, financial literacy is deconstructed and a conceptual framework is proposed. This framework is then used to classify financial literacy computer games and other digital media that have been the subject of financial literacy studies in academia, identifying aspects of financial literacy that have been relatively well or sparsely studied thus far. Finally, the results of the financial literacy studies will be summarized.

### **What is Financial Literacy?**

The term "financial literacy" has been used to describe a wide variety of educational programs and research efforts without a consistent understanding of what concepts, skills, and behaviors are covered under this umbrella (Fox et al., 2005; President's Advisory Council on Financial Literacy, 2009). In the past, this has made it

difficult to compare various financial education programs and curricula, especially to evaluate their relative effectiveness and posed a challenge to anyone developing new materials. Numerous financial education experts have attempted to give a working definition. For instance, Hogarth, at an international summit, summarized various definitions of financial literacy, elucidating three major themes that are consistently included in prior definitions:

1. Being knowledgeable, educated, and informed on the issues of managing money and assets, banking, investments, credit, insurance, and taxes;
2. Understanding the basic concepts underlying the management of money and assets (e.g., the time value of money in investments and the pooling of risks in insurance);
3. Using that knowledge and understanding to plan, implement, and evaluate financial decisions. (Hogarth, 2006, p. 3)

Hogarth's definition is similar to many others in that it ties conceptual knowledge of finance to effective *decision making* regarding financial matters (Cole & Fernando, 2008; Fox et al., 2005). When working with learners, especially adult learners, regarding financial literacy, educators assume that their learners are rational beings and will make decisions based on reasoned decision-making (Grody et al., 2008) and that decisions will lead to desired financial behaviors. Frequently, it is the existence or lack of these behaviors, such as saving for retirement, that many experts use in evaluating the financial literacy of the population or subgroups.

In an attempt to develop a standard definition of financial literacy that incorporates all of these features, the President’s Advisory Council on Financial Literacy (PACFL) has defined financial literacy” as “the ability to use knowledge and skills to manage financial resources effectively for a lifetime of financial well-being” (President’s Advisory Council on Financial Literacy, 2009, p. 37), separating out financial education as the process of gaining the required knowledge and skills. Hung, Parker, and Yoong, in a report for the RAND Corporation, responded to the PACFL definition by reformulating the definition of financial literacy to include both “knowledge of basic economic and financial concepts, as well as the ability to use that knowledge and other financial skills to manage financial resources effectively for a lifetime of financial well-being” (2009, p. 12).

As Way and Wong noted in their 2010 report, there is little understanding, even after decades of research, of how to connect the learning of concepts and decontextualized skills with the enacting of long-term, desirable behaviors or habits. Way and Wong (2010) note that many programs focus on enhancing knowledge of financial concepts but do not address changing behavior, and when they do, they assume that financial knowledge will lead naturally to financial behaviors desired.

Financial literacy, therefore, seems to be a complex construct, composed not only of conceptual knowledge but other types of understanding as well. Part of the long-term difficulty in defining financial literacy stems from the tendency to identify financial literacy with just one or two types of understanding without a conceptual understanding of the whole framework. Just as Wiggins and McTighe have postulated with their six

facets of understanding in education (2006), financial literacy seems to incorporate a number of different types of understanding relating to personal finances. Hung et al. (2009) proposed one framework of types of financial literacy by setting out several categories: “(a) a specific form of *knowledge*, (b) the *ability* or skills to apply that knowledge, (c) *perceived knowledge*, (d) good financial *behavior*, and even (e) financial *experiences*” (p. 5).

In reviewing financial literacy studies in general and financial literacy computer games in specific, the author has identified six broad categories of types of financial literacy, incorporating those suggested by Hung et al. (2009): conceptual knowledge of personal finance, skills or ability to apply that knowledge, desired financial behavior, experience with finance, identity as financially literate, and establishment of relationships with financial institutions. These six types or categories are inter-related and build upon one another or facilitate other aspects of financial literacy, and many definitions of financial literacy combine multiple types of understanding. Being weak in one aspect of financial literacy does not make an individual financially illiterate, but it can indicate an area for improvement through education, either through formal education or via help from one’s social network.

**Facets of financial literacy.** After a brief description of each type of financial literacy understanding, a conceptual model will propose an organizational framework for the different types of understanding.

**Conceptual understanding.** A conceptual understanding of financial literacy refers to the traditional, school-based knowledge an individual has regarding personal

finance. This is the declarative or explanation level of understanding that the PACFL defined as a result of financial education. This type of knowledge is certainly one of the most frequently identified by financial literacy experts, educators and game designers (e.g., Cole & Fernando, 2008; Fox et al., 2005; Grody et al., 2008; Harter & Harter, 2010; Hijinosa et al., 2010; Liu et al., 2009; McClenaghan & Aslam, 2009; O'Neill, 2008). It is generally the type of knowledge that is assessed via written or multiple-choice tests.

Various authors, educators, and game designers cite a wide range of subject that financial literacy people should know about such as:

- Advertising (O'Neill, 2008)
- Checking (O'Neill, 2008)
- Credit (Harter & Harter, 2010); McClenaghan & Aslam, 2009; O'Neill, 2008) and the process of applying for a loan (Liu et al., 2009)
- Calculations (Hijinosa et al., 2010)
- Consumer protection (O'Neill, 2008)
- Economic concepts (Hijinosa et al., 2010)
- Insurance (Harter & Harter, 2010; Koehler et al., 1995; McClenaghan & Aslam, 2009; O'Neill, 2008)
- Investment strategies (Hijinosa et al., 2010)
- Investor research (Hijinosa et al., 2010)
- Money management (McClenaghan & Aslam, 2009; O'Neill, 2008)
- Processes and procedures involved in acquiring financial services (McClenaghan & Aslam, 2009)

- Profit (Koehler et al., 1995)
- Purchasing (Harter & Harter, 2010)
- Savings (Lusardi, 2008; O'Neill, 2008)

Note that this is not an exhaustive list. A longer discussion of financial literacy subjects will be undertaken after the discussion of types of understanding.

The conceptual level of understanding is foundational for the remaining types of understanding. Similar to the remembering and understanding levels of Bloom's revised taxonomy (Krathwohl, 2002), the conceptual level of financial literacy knowledge provides an essential base. Knowing these concepts at this level does not mean that the individual is capable of applying the concepts to make decisions and take action, but it is the first, necessary level to support other levels. At this level of understanding, an individual would know and be able to explain, for instance, that credit card companies charge interest for account balance and be able to define terms such as annual percentage rate (APR), minimum monthly payment, and late fees.

***Application.*** The next level of financial literacy knowledge is that of application, which in the literature generally includes the ability to apply economic and finance concepts to making decisions, evaluating options, and making choices (e.g., Cole & Fernando, 2008; DeTar, 2009; Fox et al., 2005; Iliev-Piselli, Fadjo, & Lee, 2011; Koehler et al., 1995), but it does not yet involve actual, sustained financial behavior. It is a transitional point at which an individual has the ability to act on conceptual knowledge (Grody et al., 2008) and make strategic moves for personal benefit in the system (DeVane, 2009) if resources are available and conditions allow for action. This level of

financial literacy understanding is similar to the application and analyzing levels of Bloom's revised taxonomy.

The application level of understanding is often associated with formal financial literacy situations and is frequently assessed through working word problems or classroom role-playing simulations. A learner would be able to do activities such as conduct an analysis of credit card advertisements to determine which will meet their needs (Koehler et al., 1995) or explain how to establish credit scores and analyze how one's score affects other consumer credit, home mortgage, and auto insurance rates (Liu et al., 2009).

Although the Minnesota High School Standards for Grades 9 - 12 place personal financial literacy constructs within the Economics section of the Social Studies standards, this is approximately the level of understanding these standards would implement. Standards section 9.4.1.2 deals with applying economic concepts (found in other subsections of the 9.4 standard) to "personal financial planning, budgeting, spending, saving, investing, borrowing, and insuring decisions" (Minnesota Department of Education, 2011), which includes setting financial goals, evaluating investment options, evaluating credit options, and making critical purchasing decisions.

The application of the concepts of financial education will require at least some proficiency with the terms of the subject in order to translate into other types of financial literacy, such as establishment of relationships with financial institutions and adoption of desired behaviors. Although Horton, Davenport, Hall, and Rosenbaum (2002) did not study financial literacy *per se*, they created a simulation in which some students in the

*Virtual Economy* simulation took the role of consumers who had to evaluate information about purchases online and make purchasing decisions, save money, interact with a virtual bank, and potentially work together to get better deals in buying groups. Their study examined financial literacy as a form of information literacy performed in association with a formal learning simulation, but which often took place outside of the classroom itself. DeVane's study of how the hip hop subculture similarly examined how visitors to the hip-hop forum used both the specialized language of personal finance and appropriate culturally-based discourse to establish locally-recognized expertise in online forum discussions of how to manage personal finances. These two studies shed light on how information and language usage are part of applying financial literacy concepts in a social context.

It can be difficult to differentiate between application and a related level of understanding, namely, behavior. At the application level of understanding, a learner should be able to perform discrete actions, such as able to balance a checkbook, perhaps in a workbook exercise, which would be an application of the concepts of adding deposits and subtracting checks from the total amount in the account. To move to a behavior level, learners must have the resources and opportunity to put the skills into practice over time. For instance, one can know how to balance a checkbook but not be able to do it for a number of reasons. Way and Wong (2010) and Hung et al. (2009) stress that knowledge does not necessarily indicate ability to put behavior into action. "Knowledge of how financial systems work is likely an important underpinning for other financial skills (e.g., negotiating mortgage terms, navigating an investment website) and



performance behavior (e.g., mutual fund fee minimization). However, skills and behavior are also likely to be influenced by other factors, such as access to resources, social networks, etc. Therefore the distinctions among actual knowledge, perceptions of knowledge, the ability to use that knowledge, and actual behavior are non-trivial” (Hung et al., 2009, p. 11). The varieties of factors that impact behavior adoption suggest reasons why financial literacy education has such a poor track record of actually affecting behavior.

*Experience.* One aspect of financial literacy that is often mentioned as a barrier to financial literacy as behavior is a lack of experience, especially with enacting financial decisions by the learners themselves. Mandell (2009) has observed that high school students who take a personal finance course early in their high school career lack experience with financial decisions, which can negatively impact their motivation to learn and their retention of finance concepts. Lai, Brookshire, and Ma (2004) also argue the reason most students who take financial education courses still score poorly on financial literacy assessments is that the classes involve little real world practice. While students, especially prior to college, see their parents engaging in real-world financial experiences, young people often do not know the context or rationale for how their parents manage money (Liu et al., 2009), and thus they are prone to making mistakes during their initial forays into the financial world.

As a means of addressing this lack of experience, some researchers have created simulations by which to give students experiences in low-risk situations (e.g., Horton et al., 2002) so that “[s]tudents not only became exposed to the real-life implications of

money management but also [acquire] an understanding of the processes and procedures involved in acquiring financial services” (McClenaghan & Aslam, 2009, p. 3). In much the same way as teachers expose students to financial concepts via lecture, simulations expose learners to financial experiences and address another facet of financial literacy. In a simulated experience, learners, for instance, might be able to take their conceptual understanding of credit cards, along with their ability to evaluate the better credit card agreement terms, to participate in a simulated credit card application process as a learning exercise. This level of financial literacy knowledge is similar to Bloom’s levels of analyzing and evaluating in the revised taxonomy.

In terms of assessment, the experiential aspect of financial literacy can be evaluated either through self-reported survey data such as in the Jump\$tart Coalition’s biennial survey (Mandell, 2009), or via direct observation, especially if a computer game or simulation is used in the classroom. Educators and researchers also elicit narratives from learners to determine what types of experience students have gained either in real or simulated, game-based contexts.

***Identity/Perceived knowledge.*** Closely tied to prior experience and learning of financial concepts is an individual’s perception of him or herself as a financially literate person. This perception of one’s own ability influences a person’s confidence and the probability that they will use financial market institutions and products such as loans and insurance (Cole & Fernando, 2008). Hung et al. (2009) identified this aspect of financial literacy as *perceived knowledge*, and it is a type of knowledge that is often evaluated in

surveys using self-reported measures of confidence or perception of the subject's ability to manage money and personal finances.

Perceived knowledge, or confidence in an individual's ability with personal finance, can be heavily influenced by socio-cultural factors and one's identify as a member of a social group (DeVane, 2009). Way and Wong noted that families who talk about money and who are optimistic about the future positively affect the saving behaviors of their children (2010). Conversely, Maynard, Haas, Osterweil, Way, and Katz (2011) report that low-income people might remain unbanked (i.e. have no relationship with a banking institution) in part because of their identity as low-income people and a lack of confidence in their ability to negotiate a fair exchange with the more powerful institutions. Hence, the development of financial literacy, or lack thereof, seems "intricately bound up in the production of social identities" (DeVane, 2009, p. 13). For instance, if a student comes from a family or social group that has had negative experiences with some credit card companies, they may distrust the credit system and be uninterested in classroom exercises in comparing credit card advertisements, missing out on an opportunity to develop the ability to use credit wisely. Even when a person identifies him or herself as someone who saves regularly, the *intention* to save may not actually translate into actual behavior (Hung et al., 2009).

Lauren Willis (2008a) has expressed concern that a person's perceived financial literacy can be radically at odds with other aspects of financial literacy understanding. Jones and Chang report on a 2003 study in which 80% of participants were confident that their financial decisions were correct, but only 42% of those participants were able to

answer financial questions correctly (2011). This disconnection between conceptual knowledge and self-perception as a financially literate person means that some people are vulnerable to making errors in applying financial concepts without being aware of their mistakes. Hence, when evaluating financial literacy, it seems important to separate an individual's self-assessment of financial literacy from other aspects of financial literacy, such as conceptual understanding or experience. Confidence in abilities, or a negative perception of one's abilities, can have a large influence on linking knowledge and ability with actual behavior.

***Relationships with financial institutions.*** Differences in the ability of individuals to gain access to resources and institutions also will affect how conceptual knowledge is changed into financial competency in practice (Grody et al., 2008). If students do not have the ability to interact with mainstream financial institutions (such as banks and credit unions), their ability to turn financial education into financially literate practice will be impeded. A great deal of personal financial activity is mediated through financial institutions. A learner can understand how to save money and the value of compound interest, but without the ability, or inclination, to work with a bank or credit union, they will be unable to engage in financially literate behavior (Cole & Fernando, 2008; Grody et al., 2008).

Grody et al. (2008) have pointed out that teaching concepts such as the importance of saving is only part of the process of developing financial literacy. Even when experiential learning methods are used, students are often not encouraged establish a link to financial institutions. Links to banks and credit unions can take any of a variety

of forms. Grody et al. (2008) studied the connections banks can actively create with young children (and their families) through offering child literacy programs, child-friendly bank account types, and engaging Internet sites. These marketing efforts include age-appropriate reading material to familiarize families with young children with the workings of banks and their potential place in their financial lives. This strategy is used as part of the community outreach efforts of a number of institutions, such as Wells Fargo and Citibank. Grody et al. included visits to banking locations, establishing a casual connection with the institution, to improve the financial literacy scores of their test group (2008). The authors of this study postulated that increasing the number of ways in which children interacted with the institution, such as through games on the institution's Internet site or through opening an account would increase the likelihood that the child would continue to evidence financially literate behaviors in adulthood.

***Behavior.*** As indicated by the PACFL 2009 report's definition, desired financial behavior is ultimately one of the most strongly recognized aspects of financial literacy. A great many definitions express or imply that certain behaviors can be expected out of financially literate people, such as "paying bills on time, having manageable levels of credit, setting financial goals and having a way of achieving those goals through saving and investing, spending wisely, and so on" (Hogarth, 2006, p. 3). High amounts of consumer debt, low savings rates, and a high bankruptcy rate, naturally, are considered signs of poor financial literacy (Fox et al., 2005) not only on an individual level but also among populations as a whole.

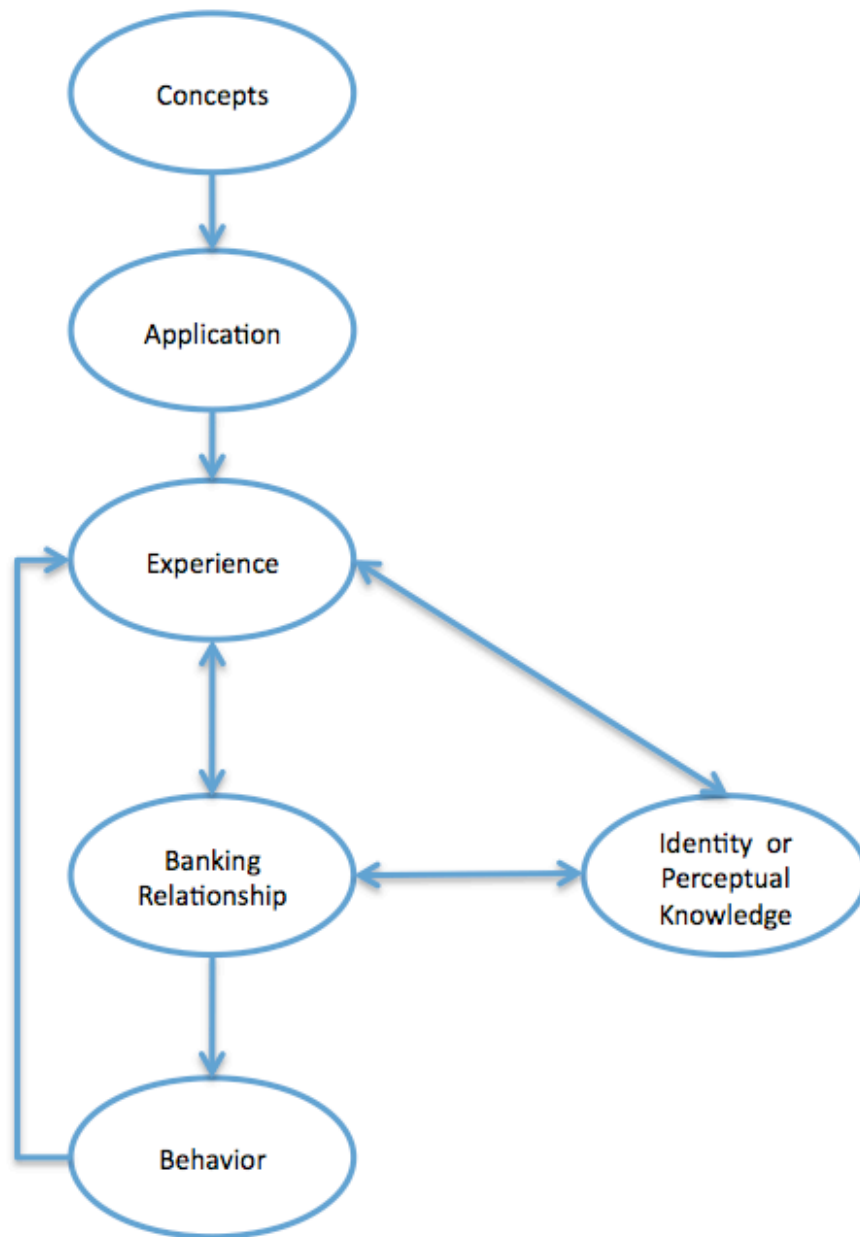
When evaluating the effectiveness of financial literacy education, many programs measure immediate results at the individual student level, using content-focused assessments (often multiple-choice) to test student understanding of the material. Fox et al. urge that we should look beyond assessing content retention to evaluate long-term, lasting effects in behavior (2005) both by individuals and in the population as a whole. Thus, financial literacy *as behavior* differs from financial literacy *as application* by virtue of sustained or repetitive action or adoption of certain habits (Cole & Fernando, 2008; Mandell, 2009; Maynard et al., 2011). Researchers look for what they consider a behavior *change* as people *become* financially literate (Ash, 2009; Bateson, 2009; Hogart, 2006), such as increasing savings or beginning to participate in the stock market.

Evaluating desired financial behavior on an individual level can be challenging, and numerous studies such as Bateson's 2009 study of *Real Money, Real World* assess results via self-reported changes in behavior (Bateson, 2009; Hung et al., 2009; Mandell, 2009). This use of self-reported data naturally can result in over-reporting of behaviors considered to be socially desirable. A few studies, however, have been able to observe behavior either during or after personal finance lessons. Developers of the finance game *MyInvestment* built in evaluative tools that teachers can use in assessing student actions in the game (Chen et al., 2010), and Wells Fargo has been able to track finance behavior of customers who have taken an online credit card responsibility course (Donnini et al., 2011). These reports expand our understanding of what can be used in evaluating target behavior adoption for individuals, especially when digital education and computer games are used in education.

In some situations, the behavior level of financial literacy understanding may mirror the creating level of Bloom's revised taxonomy of thinking skills, especially when learners engage in creation of businesses or products to sell in a simulated economy. For instance, in the *Virtual Economy* simulation (Horton et al., 2002) half of the learners created businesses and sold information as a product to the other half of the participants. In order to participate at this level, they were required to plan their strategy for success, aggregate information into a product to offer to potential customers, and publish advertising information about their product. These activities are suggested as types of activities appropriate when using Bloom's taxonomy for educational digital media (Guhlin et al., 2012).

Financial literacy behavior is frequently reported in the aggregate for the general population, using certain measures as indicators for overall financial literacy. Savings behavior, especially planning for retirement, is often used as a general measure of financial health and literacy (Lusardi, 2008), but other measures such as participating in the stock market (Lusardi, 2008), investment, financial protection behavior (such as buying insurance) are potentially important indicators as well (Cole & Fernando, 2008).

These six aspects of financial literacy are certainly closely related and mutually dependent. The following concept map illustrates how a learner progresses from the acquisition of financial literacy concepts through to repeated performance of desired financial behaviors.



**Figure 3: Relationships between types of understanding associated with financial literacy**

In this scheme, conceptual knowledge of financial literacy concepts is the foundation for the application of those concepts. Application of the concepts becomes contextualized and relevant to the student with the introduction of experiences, either



simulated in the classroom or via the social group. When a positive, pro-financial institution identity or self-perception is combined with an actual or potential banking relationship, then desired financial behaviors can develop over time. Note also that financial literacy as behavior also feeds back into financial literacy experience, which in turn can influence a shifting perception of oneself and one's identity regarding personal finance as well.

**Subject domains.** Up to this point, the analysis has been about aspects of financial literacy without addressing the actual subject matter or content that should be included in financial education. Hung et al. (2009) in addition to explicitly recognizing different types of financial literacy knowledge also specifically separated types of knowledge from subject domains. In their case, they listed three subject domains in their classification: saving, investment, and credit. In reviewing various studies of financial literacy programs, especially those focused on using computer games, simulations, and mobile application, the author has expanded that domain list considerably. Various authors list different subjects and classify them in a wide range of groupings. For the purposes of this review, the following categories of content will be used: saving, investing, credit/debt, income/career, entrepreneurship, money management, insuring, purchasing, and the financial system & industry. Since these categories have a variety of interpretations and include concepts at a finer granularity, a brief definition of each will help forestall confusion.

***Saving.*** In general, saving money is a significant topic in any discussion about financial literacy and is included in many financial education programs (Ash, 2009;

Bateson, 2009; Grody et al., 2008; Harris, 2009; Hinojosa et al., 2010; Liu et al., 2009; O’Neill, 2008). Saving is often the first introduction that children have to financial management as they are encourage to begin saving for small purchases (Jones & Chang, 2012). A particular focus that is gaining increasing attention is long-term saving, such as for retirement (Fox et al., 2005; Lusardi, 2008; Using Video Games to Teach Financial Literacy, 2011) or to have an emergency fund (PACFL, 2009).

In addition, some programs also stress the long-term results of earning interest (Grody et al., 2008; Using Video Games to Teach Financial Literacy, 2011) and encourage learners to set saving goals (DeTar, 2009). Interestingly, even programs aimed at young children can teach concepts such as delaying gratification (Grody et al., 2008) as well as recognition of coin denominations and basic numeracy concepts and practice.

***Investing.*** In contrast, defining the subject domain for investment includes a broader range of concepts and subtopics. Some authors have included understanding the importance of diversification, holding assets over the long term (Grody et al., 2008), and the gradual building of equity (Liu et al., 2009).

Some authors have simply included “investment skills” (Stickle & Garcia, 2010, p. 1) in their descriptions of what students should learn about investing while others specify that students should know investment planning strategies (Ash, 2009; Hijinosa et al., 2010), be able to do investor research (Hijinosa et al., 2010; O’Neill, 2008), understand calculations used in investing (Hijinosa et al., 2010), and have simulated investment trading experience (Lai et al., 2004).

A variety of investment avenues are suggested as part of financial literacy. Ranging from checking and savings accounts (Chen et al., 2010; Liu et al., 2009) and certificates of deposit (Koehler et al., 1995; Liu et al., 2009) at one end of a spectrum up through mutual funds (Grody et al., 2008), stocks and bonds (Chen et al., 2010; Koehler et al., 1995; Liu et al., 2009; O’Neill, 2008), and IRAs, 401(k) and 403 (b) plans (Liu et al., 2009) at the other. Fortunately, this broad spectrum has room for students from a wide range of socio-economic status to find socially and culturally appropriate ways to apply the idea of investing for the future.

***Credit/Debt.*** The responsible use of credit, especially credit cards, is also a theme found in many financial education programs and studies. As a category, it includes concepts such as the charging of interest on credit (Grody et al., 2008; O’Neill, 2008) and the implications for the borrower (McClenaghan & Aslam, 2009) but is otherwise focused on the application of those concepts, how a borrower relates to credit card companies and lenders, and how to manage debt and credit in one’s life.

Some programs incorporate analysis of credit card advertisements to determine which would meet the learner’s needs (Koehler et al., 1995) and familiarize them with the process of applying for a loan (Liu et al., 2009; PACFL, 2009). This category also includes understanding the financial system to some extent such as knowing about credit scores and the effect they have on other financial matters (Liu et al., 2009), such as affecting the interest rate on a home loan (DeVane, 2009).

A variety of financial education programs and computer games aim to help learners experience virtually such tasks as borrowing money for large items such as

schooling or a car (Liu et al., 2009) or dealing with student loan debt (Mad City Money Simulation Kit, 2010), and learning to use credit and debit cards carefully (Ash, 2009; Harter & Harter, 2010; Mad City Money simulation Kit, 2010). Given the current concerns over consumer debt, it is no surprise that many studies include managing debt (Fox et al., 2005; Harris, 2009; Liu et al., 2009; Mad City Money simulation Kit, 2010; Using Video Games to Teach Financial Literacy, 2011) and understand the importance of repaying money promptly (Bateson, 2009; Using Video Games to Teach Financial Literacy, 2011) as key concepts to cover in financial literacy education.

***Income/Career.*** As will be discussed in the review of financial literacy computer games, a number of these games incorporate earning virtual money as an important feature to making the game interesting and engaging. A few specifically include *learning about* earning money and future careers as key topics in financial literacy (e.g., Liu et al., 2009). This category includes not only learning about career choices (Bateson, 2009) and employment but also includes consideration of the decision to attend college, choosing a college major, and deciding whether or not to work while in school (Liu et al., 2009).

***Entrepreneurship.*** Closely related to the topic of careers is the subject of entrepreneurship. Early definitions of financial literacy included business-related topics such as “profit” (Koehler et al., 1995). Curricula in the United States school systems do not generally include an emphasis on entrepreneurship, but this is seen as an important topic in school systems in other parts of the world, which prompts the inclusion of entrepreneurial skills and thinking in discussions of curriculum revision in this country (Partnership for 21st Century Skills, 2008; Wagner, 2008).

There is a connection between financial literacy and entrepreneurship in some studies. DeVane (2009) found, for instance, that hip-hop subculture is highly entrepreneurial, which can form a bridge between young people who are part of that culture and discussions of financial literacy concepts. McClenaghan and Aslam (2009) also linked financial literacy education with entrepreneurship, viewing entrepreneurial skills such as the ability to raise capital, manage finances and plan for the future as important learning for students, even those who would not run businesses or work in the financial services industry. In the Horton et al. (2002) study, one set of students in their *Virtual Economy* simulation learning how to evaluate prospective market niches, how to create products for them, how to advertise, and how to manage customer relations in order to learn the importance of consumer information literacy in e-commerce.

***Money management.*** As a category of financial literacy subjects, money management is a difficult category to define. Some authors have included knowledge about advertising, checking, and consumer protection (O'Neill, 2008) under the financial literacy umbrella. Money management also seems at times to include an understanding of how income and spending relate to the maintenance of favorable balances and asset accumulation (Using Video Games to Teach Financial Literacy, 2011) as well as decision making and record-keeping skills needed to manage finances on a daily basis.

Several authors explicitly include budgeting as an important subject in financial literacy (e.g., Fox et al., 2005; Koehler et al., 1995; Liu et al., 2009; Mad City Money Simulation Kit, 2010; O'Neill, 2008) and include it in the area of money management. Others refer instead to similar tasks such as managing current consumption (Using Video

Games to Teach Financial Literacy, 2011) or managing household cash flow (PACFL, 2009). As part of this category, the necessary task of records management includes managing a checkbook (O'Neill, 2008), tracking expenses (Bateson, 2009), and general record keeping (Liu et al., 2009).

***Insuring.*** A number of authors such as O'Neill (2008) and McClenaghan and Aslam (2009) have included insurance as a category within financial literacy. Conceptually, insuring includes an understanding of principles such as understanding how insurance spreads risk across a pool of policy holders (Koehler et al., 1995) and the importance of having various types of insurance, for possessions, health, disability, and life (Liu et al., 2009). It also includes adoption of behaviors (actual or simulated) such as buying one or more types of insurance, depending upon the situation of the person (Cole & Fernando, 2008; Harter & Harter, 2010).

***Purchasing.*** Learning about purchasing items is a frequently included topic in financial literacy education (e.g., Koehler et al., 1995). The scope of purchases is often age-appropriate, with small items (candy or toys) as the focus for small children and houses and cars being the training focus for high school, college, and young adult learners.

Concepts covered under the topic of purchasing include advertising, consumer protection, money and values (O'Neill, 2008) and criteria for making purchasing choices, especially for large purchases such as cars and houses (Fox et al., 2005; Harter & Harter, 2010; Liu et al., 2009). Included in this subject category is awareness that many large

purchases cost more over time than is indicated by the listed price, especially when items are purchased with credit.

Purchasing as a category includes "... training for teens and young adults about matters pertaining to wise spending choices and personal responsibility" (Liu et al., 2009, p. 5) and is focused in many studies on how to evaluate options and make rational decisions. They include training and practice with interacting with businesses, often simulated (e.g., Liu et al., 2009; Mad City Money Simulation Kit, 2010) in order to learn to weigh advantages vs. disadvantages of certain choices. Some authors have also included the ability to use specialized language in order to understand their options from advertisements and converse with sellers and financial institutions (DeVane, 2009).

This category is one in which financial educators also introduce critical reflection of the state of the economy and open up the discussion of collective purchasing power. They encourage learners to compare prices (Bateson, 2009) and spend less (DeTar, 2009) at the easy end of the spectrum. They also open up the possibility that learners will go deeper, examining motivations for purchases, questioning the assumption of pure rationality in purchasing decisions (DeTar, 2009), and finding that they can exert force on the system to influence the type of products offered and obtain favorable pricing (Horton et al., 2002).

***Financial system/industry.*** Since financial institutions play a central, facilitative role in supporting financial literacy behaviors, it is frequently included as subject in financial education and financial literacy games. Some educators have concluded that teaching "children about either the structure or mechanics of the financial industry [is] a

prerequisite, in our opinion, to truly making sense of financial concepts” (Grody et al., 2008, p. 3). Some specific topics have been suggested, such as knowing commonly cited economic indicators and how the Federal Reserve Bank operates (O’Neill, 2008), understanding the capital market system (PACFL, 2009), financial institutions (Ash, 2009; PACFL, 2009) and taxes (Maynard et al., 2011).

This subject, of course, also includes understanding processes and being able to apply these concepts in order to either acquire access to financial services (McClenaghan & Aslam, 2009) or to solve financial problems (DeVane, 2009). In some cases, simulations have included interaction with virtual banks and credit granting institutions in order to give learners experience with different aspects of the financial services industry, even if only in a virtual fashion (Liu et al., 2009).

***Economic concepts.*** The final category of financial literacy subjects includes the intersection between economic concepts, particularly microeconomics, and personal financial management. Topics in this category include such concepts as supply and demand and how it affects pricing, how competition among businesses can affect quality or prices of products to the consumer, and how borrowing rates affect business decisions to expand or contract product lines. Since many state educational standards do not have a separate category for personal financial literacy, the related concepts of individual financial management are included with economics in the social sciences standards, such as in Minnesota (Minnesota Department of Education, 2011).

A few games, such as Visa’s *Financial Football* and *Financial Soccer* (available at <http://www.practicalmoneyskills.com/games/trainingcamp/>) are aimed at conveying



and assessing this broad financial literacy topic. Other games, such as *Farmtasia*, have been designed to give the learner experience toward understanding the complex interplay between various economic forces (Cheung et al., 2008).

**Knowledge type vs. subject domain matrix.** By combining the range of types of financial literacy with the list of subject domains, it is possible to construct a framework for operationalizing financial literacy and for situating interventions and studies within that framework (see Table 1 below). This will allow researchers and educators to identify the type of understanding intended as well as the topics covered. It will also improve comparisons between two studies on similar topics, identifying, for instance, that study A aimed at a conceptual understanding of how credit card interest is compounded while study B intended to measure how participants used that knowledge to change their credit using behavior. While both address credit as a topic, their outcomes - and evaluation strategies - are expected to differ.

For purposes of this study, the knowledge type - subject matrix is intended to assist in discussing the various studies of financial education computer games and virtual worlds. Various games and studies can be located on the matrix, identifying the subject matter and type of understandings involved, recognizing that many computer games and virtual world simulations will appear in multiple cells of the matrix. Once financial literacy computer games have been categorized, patterns may emerge and suggest areas for future interventions and research in sparsely covered sections.

**Table 1: Financial Literacy Classification Matrix**

Facet/Domain	Concepts	Application	Behavior	Experience	Identity	Financial Institution
Saving						
Investing						
Credit/Debt						
Income/Career						
Entrepreneurship						
Money Management/Budgeting						
Insuring						
Purchasing						
Financial system/industry						
Economic concepts						

In addition, this framework is intended to assist in studying financial literacy learning in informal learning situations. As will be discussed below, the majority of research has concentrated thus far in studying the use of computer games and virtual worlds in formal situations, often involving classroom learning. In these cases, the designers of the interventions were able to link the intended learning outcomes to their evaluation methods. In order to move to less structured, more naturalistic environments to study self-directed or peer-based learning, this matrix should assist in structuring observations and identifying financial literacy learning episodes that occur during normal computer game play or participation in virtual world economies.

**Prior Studies of Financial Literacy Learning via Computer Games and Digital Media**

As Way and Wong (2010) point out, the number of technology-based tools in financial education has grown extraordinarily in recent years, resulting in a large and

expanding number of computer games, simulations, and mobile apps available for financial literacy education. The Jump\$tart Coalition for Financial Literacy alone lists 94 computer games, simulations, and mobile apps in its selective, curated database. The range of computer programs used in financial education is truly as broad and varied as the range of definitions of financial literacy used over the past few decades. For instance, online games and mobile applications such as Visa's *Ed's Bank* have been developed to teach children as young as four how to recognize coins and deposit them in a bank in order to save up for small purchases. At the other end of the saving spectrum, games such as *Bite Club* (by Doorways to Dreams) and the games on *Credit Union Island* in *Second Life* educate players on the importance of saving for retirement. There are computer games, simulations, mobile apps, and other digital media that address a wide range of types of skills as well, ranging from those that teach basic concepts to those that encourage players to adopt life-long behaviors.

Surprisingly, given the number of computer games developed for financial literacy education, few have been studied by educators. A search for studies on financial literacy education via computer games yielded 22 academic publications or conference presentations. Of these, 21 examined financial literacy learning that was enhanced or facilitated by 18 computer games in either formal (classroom) or informal learning contexts. Some computer games, such as *Pecunia*, the *Stock Market Game* and the *Financial Literacy Game*, were included in multiple articles or conference presentations. One study examined informal, peer-to-peer financial literacy learning that takes place in an online discussion forum (DeVane, 2009). Since there is nearly a one-to-one

correspondence of articles to the games or digital media, they are listed in Table 2, along with abbreviations for each game listed that will be used in subsequent tables.

While other financial literacy computer games and online educational programs have been the subject of white papers, these are frequently created by businesses that are marketing their product and will not be included in this review. Classroom interventions that only involve face-to-face games and simulations, without a digital media component, will not be included in this review. Also, for the purposes of this study, specialized

**Table 2: Summary of Financial Literacy Games and Virtual World Sites Analyzed**

<b>Digital Media Studied</b>	<b>Abbreviation</b>	<b>Associated Studies</b>
<i>Bandillero</i>	B	Iliev-Piscelli, 2011
<i>Bank-It</i>	BI	Iliev-Piselli et al., 2011
<i>Bite Club</i>	BC	Maynard et al., 2011
<i>Credit Calamity</i>	CC	Maynard et al., 2011
Entrepreneurship in Primary Education	EEB1	Pereira et al., 2009
<i>Farm Blitz</i>	FB	Maynard et al., 2011
<i>Farmtasia</i>	FARM	Cheung et al., 2008
<i>Financial Literacy Game</i>	FLG	Liu et al., 2009; Ozercan, 2010
<i>Financial Services Island</i>	FSI	McClenaghan & Aslam, 2009
Hip Hop Forum	HH	Devane, 2009
<i>Merry Miser</i>	MM	DeTar, 2009
<i>MyInvestment</i>	MI	Chen et al., 2010
<i>Pecunia</i>	P	Jones & Chang, 2011; Jones & Chang, 2012
<i>Refund Rush</i>	RR	Maynard et al., 2011
<i>Stock Market Game</i>	SMG	Harter & Harter, 2010; Hinojosa et al., 2009; Hinojosa et al., 2010
<i>Stock-Trak</i>	ST	Lai et al., 2004
<i>Virtual Economy</i>	VE	Horton et al., 2002
<i>Virtual Stock Exchange</i>	VSE	Stickel & Garcia, 2010

computer games and simulations used in teaching courses in business, finance, and economics departments have not been included. This study also does not address the use of virtual world and virtual economics simulations for use in experimental economics studies or for training professionals in the financial and banking industries.

**Subject domains and knowledge facets addressed.** In order to provide a sense of what subject domains and types of knowledge have been the desired outcomes of the studied financial literacy games, each study was reviewed and categorized. For each game and the hip hop discussion forum, the target subjects were identified and an estimate of type of knowledge was made based on the description of the game and/or assessment strategies. When target subject domain and the knowledge type are laid out as dimensions of a table, the resulting matrix, in Table 3, gives a projected estimate of the full range of financial literacy topics addressed by each of the computer games and digital media used in the reviewed studies. When considering two types of financial literacy knowledge, financial institution relationship and behavior, a distinction was made between simulated and tangible world relationships and behaviors. Some games, such as the mobile app *Merry Miser*, are designed to work with actual financial institutions and track real world spending patterns using legal currency issued by a government. This is a potentially important distinction when comparing *Merry Miser* to other games in the list that operated in simulated economies using virtual financial institutions. While some studies have suggested that simulated financial behaviors in games may have an impact on financial behaviors adopted in the tangible world with legal currency (e.g., Donnini et al., 2011), the transfer between these two cannot be assumed.

**Table 3: Aspects of Financial Literacy Addressed in the Digital Media Reviewed**

Facet/Domain	Concepts	Application	Behavior	Experience	Identity	Financial Institution
Saving	MM, FLG, BC, FB, SMG	MM, FLG, BC, FB, P, SMG	MM	MM, FLG, BC, FB, P SMG		MM
Investing	FARM, FLG, SMG	SMG, VSE, ST, FARM, FLG		SMG, VSE, ST, FARM, FLG		
Credit/Debt	FLG, BI, CC, BC, FB	FLG, FSI, CC, BC, FB, HH, P	B	FLG, FSI, CC, BC, FB, P	B, HH, CC	
Income/Career	FLG, MI	FLG, FSI, MI, P	B	FLG, FSI, MI, P	B	
Entrepreneurship		FSI, VE, HH, EEB1		FSI, VE	HH	
Money Management/Budgeting	MM, FLG, MI, BI, BC	MM, FLG, FSI, P, MI, BC	MM	MM, FLG, FSI, P, MI, BC		MM
Insuring		FSI, P		FSI, P		
Purchasing	MM, FLG, MI, BI, BC	MM, FLG, FSI, MI, VE, BC	MM	MM, FLG, FSI, MI, VE, BC		MM
Financial system/industry	FLG, BI, RR	FLG, FSI, RR, P		FLG, FSI, RR, P		
Economic concepts	FARM	FARM		FARM		

All of the subject domains are covered by at least one of the computer games or digital media forum studies, and all types of financial literacy understanding are represented by at least one study. The breadth of subject and knowledge type coverage illustrates the potential of computer games and other digital media to address the wide range of financial literacy topics and skills included in the various definitions of financial literacy. These studies have shown that it is possible to use computer games and digital media in addressing any of the aspects of financial literacy, although some subject domains have received more attention than others.

Most of the financial literacy subtopics were the subject of between five and seven studies. These topics were credit/debt, purchasing, saving, investing, and money management. The emphasis on these topics is consistent with the most prevalent definitions of financial literacy and also the commonly cited markers for financial literacy in the general population (Hogarth, 2006; Lusardi, 2008). Other commonly cited topics, understanding aspects of the financial system such as banking and taxes (Hogarth, 2006), received moderate coverage in four studies. One aspect of classic definitions of financial literacy, insurance, as well as the overarching understanding of economic concepts were covered in only one study each, which opens up an area of investigation for further financial literacy game development and studies on ways to educate students not only about insurance in their lives, but also the application of economics to the situations and actions of individuals.

In addition, these studies show that it is possible to address the various types of knowledge in financial literacy through incorporation of computer games and digital

media. Here, however, the distribution of studies is markedly uneven, which may shed light on the strengths and weaknesses of computer games for financial literacy education.

Many of the computer games for financial education address the application and experience aspects of financial literacy. In these games, the player is expected to analyze their situation and make decisions based on information that addresses the application aspect of financial literacy and accounts for how the majority of the studies involved the application type of knowledge. In two studies, however, a different type of learner activity addressed this type of knowledge. In the *Entrepreneurship in Primary Education* study (Pereira et al., 2009), primary school children in Portugal applied their understanding of entrepreneurial activities by participating in the design of virtual businesses in the virtual world *Active Worlds*. In DeVane's study of peer-to-peer learning in an online discussion forum, learners applied their understanding of personal finance through discussions, demonstrating their financial literacy through use of specialized language and appropriate, situated use of evidence to defend their expertise (2009).

The Portuguese and hip hop forum studies were the only two in which application of personal finance concepts did not also incorporate the experience level of financial literacy knowledge. In the case of the Portuguese children, their businesses were designed and partially created in the virtual world, but the world was never opened up for use, and so these children did not actually experience the results of their creations and received no feedback on their decisions. Similarly, the discussants in the hip hop forum may have gained valuable information and practice with their peers but did not have the



opportunity in that environment to try out their new found information and fluency with specialized language in a context where they could assess their level of success. This is an important point for developers of financial literacy computer games and educators. For application to bridge to experience, the learner needs formative feedback upon which to reflect and use in development of future actions.

The computer games designed for informal learning environments, or that were designed for self-directed experiential learning with minimal teacher intervention, were the ones that most often addressed the conceptual aspect of financial literacy education, although they used a variety of techniques to do so. The *Financial Literacy Game* in *Teen Second Life* used digital media such as videos and texts accessed in the game to provide conceptual knowledge through short episodes of direct instruction (Liu et al., 2009; Ozercan, 2010). In contrast, many of the other games presented players with situations designed to foster experiential learning through reflection, hypothesis drafting, experimentation, and feedback (Kolb, 1984). Games such as *Farm Blitz* create short episodes in which the player must deduce a successful game strategy that would mirror desired behaviors in the tangible world, such as maximizing the number of slow income investments (i.e., income producing trees) while restricting the number of high expense items purchased (i.e., hungry rabbits) (Maynard et al., 2011). Some computer games used in classroom settings also followed this strategy, including the teacher as a facilitator of debriefing and development of hypothesis or conceptual learning (Chen et al., 2010; Cheung, et al., 2008).

When excluding simulated relationships with financial institutions and behaviors, these two types of financial literacy knowledge categories are markedly underrepresented. An examination of Table 3 shows the advantage mobile apps such as *Merry Miser* have in addressing desired financial behavior in the tangible world. Since these types of computer programs can be used while the players are engaging with financial actions and can share information with legally recognized financial institutions, they clearly are poised to affect behavior that has immediate and tangible consequences. Using tools such as this mobile app to support just-in-time learning and as a tool to support thinking (DeTar, 2009) could provide many people with highly situated learning opportunities (Lave & Wenger, 1991). This would appear to be an area in which further studies and financial game development (such as *Bank-It*, currently in design) should be considered.

An examination of Table 4 shows where computer games and digital media have great potential to prime players with simulated experiences and practice that may lead to consequential behavior in the tangible world. Early reports from Wells Fargo (Donnini et al., 2011) and Doorways to Dreams (Maynard et al., 2011) suggest that playing financial literacy games (sometimes in conjunction with other online educational materials) can lead to changes in so-called real world behaviors. These games also, because of their designed ability to track player actions and scores, can be used to assess interactions

**Table 4: Aspects of Financial Literacy Addressed by Digital Media, including Simulated Behaviors and Institutions**

Facet/Domain	Concepts	Application	Behavior	Experience	Identity	Financial Institution
Saving	MM, FLG, BC, FB, SMG	MM, FLG, BC, FB, P, SMG	MM, <b>SMG</b> , <b>FLG</b>	MM, FLG, BC, FB, SMG, P		MM, <b>SMG</b> , <b>FLG</b> , <b>P</b>
Investing	FARM, FLG, SMG	SMG, VSE, ST, FARM, FLG	<b>SMG</b> , <b>VSE</b> , <b>ST</b> , <b>FARM</b> , <b>FLG</b>	SMG, VSE, ST, FARM, FLG		<b>SMG</b> , <b>VSE</b> , <b>ST</b> , <b>FARM</b>
Credit/Debt	FLG, BI, CC, BC, FB	FLG, FSI, CC, BC, FB, HH, P	B, <b>FLG</b>	FLG, FSI, CC, BC, FB, P	B, HH, CC	<b>FLG</b> , <b>P</b>
Income/Career	FLG, MI	FLG, FSI, MI, P	B, <b>FLG</b> , <b>MI</b>	FLG, FSI, MI, P	B	<b>FLG</b> , <b>P</b>
Entrepreneurship		FSI, VE, HH, EEB1		FSI, VE	HH	
Money Management/Budgeting	MM, FLG, MI, BI, BC	MM, FLG, FSI, P, MI, BC	MM, <b>FLG</b> , <b>MI</b>	MM, FLG, FSI, MI, BC, P		MM, <b>FLG</b> , <b>P</b>
Insuring		FSI, P		FSI, P		<b>P</b>
Purchasing	MM, FLG, MI, BI, BC	MM, FLG, FSI, MI, VE, BC	MM, <b>FLG</b> , <b>MI</b>	MM, FLG, FSI, MI, VE, BC		MM, <b>FLG</b>
Financial system/industry	FLG, BI, RR	FLG, FSI, RR, P	<b>FLG</b>	FLG, FSI, RR, P		<b>FSI</b> , <b>FLG</b> , <b>P</b>
Economic concepts	FARM	FARM		FARM		

and game behaviors directly. This opens up a realm of possibility for educators who may not be restricted to assessment of financial literacy only at the conceptual level via written or multiple-choice tests.

It is important to note that simulated behavior may be possible in a computer game environment without involving relationships with simulated financial institutions because the computer game's internal money and exchange systems can stand in as a proxy for banks and other financial institutions. For instance, a computer simulation can keep track of a player's amount of virtual cash as a type of scorecard, without requiring the player separately to open an account with a simulated institution. A computer game can also program this additional step in as part of its educational system if interaction with simulated financial institutions is a desired outcome.

One aspect of financial literacy that is not well represented by financial literacy digital media studies is perceived knowledge/identity. This aspect of financial knowledge has generally been considered in terms of how a lack of confidence (Cole & Fernando, 2008) or membership in a disaffected group vis-à-vis financial institutions (Maynard et al., 2011) deters people from engaging in the types of behavior financial literacy experts define as financially literate. Both the DeVane study (2009) and the development work by the Doorways to Dreams Foundation have focused on ways to make personal finance culturally appropriate and non-threatening to the poor, the working-poor, and marginalized subgroups. These efforts and studies have aimed at bridging the gap and aiding learners in developing confidence and a self-concept that will

facilitate the other aspects of financial literacy education, especially among groups that are not generally served by other financial literacy education efforts.

Since all of the studies described here can be grouped into one or more categories on each dimension of the subject/knowledge type matrix, the classification scheme for subject domains and knowledge types seems complete. This scheme can then serve as a useful framework when looking at other personal finance learning situations, especially informal learning in naturalistic settings, to identify the subject matter and level of learning taking place.

Examining the matrices (Tables 3 and 4) reveals that there are many blank intersections of subject/knowledge type where there have been few, if any, studies addressing a particular combination of the two dimensions of financial literacy. In addition, there are other dimensions not included in this framework, such as age categories and socio-economic status of students. Although the studies reviewed in this section have revealed broad coverage of the spectrum, the number of studies is remarkably few, inviting further research into nearly any subject or type of knowledge associated with financial literacy. The proposed study intends to explore two aspects of financial literacy learning via digital media that have not received a great deal of academic attention thus far: the subject of entrepreneurship, especially the knowledge types of simulated behavior and identity of the participants as financially literate and confident in their ability to take action not only in their simulated businesses but in the tangible world as well.

## Results of Studies

Studies break into two major categories regarding results. Many computer games for financial literacy are in the early stages of development or testing. Those studies often focused on the results of beta or pilot testing the computer programs themselves, including data from players about their perceptions of its value in learning about personal finance or how enjoyable it was to play. Some of the studies did assess student outcomes as a result of using the computer games, either alone or with a classroom curriculum. These studies of student financial literacy learning range widely in methodology, ranging from a large-scale randomized experiment with control and treatment groups at one end of the spectrum to studies that did short pretest/posttest protocols.

**Usability studies and pilot tests.** Many of the studies are focusing first on evaluating the technical aspects of creating an educational computer game. These studies evaluate various computer programming implementation strategies to answer the question of whether or not a financial literacy game can be created, using development platforms such as *Second Life*, *Active Worlds*, *Open Sim*, and mobile application development kits, that are relatively accessible to educators who do not have significant training in computer science and programming (DeTar, 2009; Iliev-Piselli, 2011; Iliev-Piscelli et al., 2011; Liu et al., 2010; Pereira et al., 2009). Other studies are exploring systems that will be able to track learner behaviors and account information to teachers for assessment and to use in guiding student learning and experimentation (Chen et al., 2010). While these initial forays into education game development are useful in guiding future development projects and should be consulted by interested financial literacy game

developers, these studies do not significantly aid in answering the question of whether or not students can learn financial skills or concepts through using them.

Some of the studies that focused on the evaluation of the computer games studied the player experience of the game for learning rather than assess student learning. Their results reveal valuable information for educational computer games, both in general and for financial literacy education. Pereira et al. (2009), for instance, demonstrated that young children could use the virtual world *Active Worlds* to apply entrepreneurial principles when guided and scaffolded by adults and worksheets to create their own virtual businesses. Elementary school students in Taiwan were also able, in a computer lab, to engage in experiential learning in a complex virtual environment with minimal guidance from their instructors (Chen et al., 2010). In both cases, young students were able to engage in solving complex, ill-defined problems relating to finance using virtual worlds and computer games.

Mobile apps, such as *Merry Miser*, *Bank-It*, and *Bandillero*, at the other end of the technology and age spectra, have gotten positive responses about the **design** of a financial learning application capable of being used just in time to encourage application of financial decisions to directly affect financial behaviors (DeTar, 2009). Unfortunately, all of these mobile apps seem to be in early design or testing phases and may never become widely available. DeTar reported that problems with the technology itself were barriers to use. The pilot test of the *Merry Miser* application was extremely limited, and the impact on player knowledge or behavior is not known. According to the development website, *Merry Miser* was a prototype and is no longer in active development. The

current status of *Bank-It's* development process is unknown as of this writing.

Bandillero's first testing sequence was slated to begin in the spring of 2012, focusing on usability issues rather than an assessment of student financial literacy learning (Iliev-Piscelli, 2011).

**Qualitative studies of student outcomes.** A number of studies evaluated student learning outcomes and student engagement reported by classroom teachers who collaborated in testing financial literacy computer programs. These teachers reported that students took “in a lot more information when using the virtual world compared to more traditional approaches and that behaviour and attention was easier to manage” (McClenaghan & Aslam, 2009, p. 8). Students exhibited high levels of engagement with the material because of the computer games, often continuing to work on exercises during class breaks or even out of school. The success of the innovative pedagogy was documented by comparing qualitative and observational data gathered both prior to and after use of the computer games (Horton, et al., 2002). Through diary entries, assignment results, and analysis of computer logs, studies of *Financial Services Island* and the *Virtual Economy* concluded that students were successful in learning financial concepts and skills and were more engaged in the learning process.

**Quantitative studies of student outcomes.** Other studies assessed the results of the computer programs for learning through a pretest/posttest protocol utilizing a treatment but no control group. The evaluation sample was not randomly drawn from the population, and treatment groups were usually convenience samples, specifically classes or groups in a computer camp. For example, Cheung et al. (2008) did an exploratory



study of *Farmtasia* with 16 students in grade 10 equivalent (Hong Kong). They did a pre- and post-test assessment to evaluate content learning over a 2-week period and found a 10.62 (out of 100) point gain. Similarly, the *Virtual Stock Exchange* was tested over a one-month period, in a high school class, using a simple 10-question pretest/posttest that revealed a significant increase in test scores at the end of the study (Stickel & Garcia, 2010). Initial testing of the online game *Celebrity Calamity*, using a standard assessment from the National Endowment for Financial Education, also showed a “50 percent to 70 percent improvement in answering key financial questions correctly” (Osuri, 2011b).

Not all studies, however, show such promise. Initial tests of the ambitious *Financial Literacy Game* in *Teen Second Life* showed mixed results, probably because of the demographics of the students used in testing. While participants from a finance class showed an increase from an average score of 9.33 to 9.78 on a 10-point test, the participants from a computer class actually decreased their scores from 7.30 to 7.21 on the same test (Ozercan, 2010). While all students found the game motivating and “believed that learning finance through a 3-D virtual world increased their finance knowledge and was useful” (Liu et al., 2009, p. 69), this pair of studies is a reminder of the importance of context for implementation of learning interventions, even fun ones.

The most rigorous and compelling studies have centered on a game that has been used in classroom-based financial learning since 1977: the *Stock Market Game*. Its current version uses online information and communication tools to support learning about investments through a competitive, team-based game. This game was the subject

of two large-scale experimental studies employing samples from a larger population. One study was a true pretest-posttest control group design with random assignment of teachers and their associated classes to either a control or treatment group. The treatment and control group teachers did not differ significantly on demographic variables such as years of teaching, location, minority status, socio-economic status, etc. The 568 teachers (296 treatment and 272 control) from around the country taught a semester course to students from grades 4 to 10. The treatment group used the *Stock Market Game* in their courses; the control group taught their courses as usual. The authors created their own pre and posttest instrument based on the Jump\$tart Coalition's biennial survey (Hinojosa et al., 2010).

The second study was a quasi-experimental design using pretest/post test protocol on both a treatment and control group, although the assignment to each group (also by teacher with associated classroom) was not random and the two groups were nonequivalent. The test group teachers had more graduate credits in economics than control group teachers, and teachers in the test group had 1.5 years more experience in teaching (both in general and in economics) than in the control group, but both groups had attended about the same number of economics workshops. Harter and Harter studied the use of the *Stock Market Game* combined with the *Learning from the Market* curriculum, offered in conjunction with the game. Their control group also taught an equivalent course using their standard curriculum. This study involved 730 students total, with 395 students in the test group and 335 students in the control group. All were from

the state of Kentucky (Harter & Harter, 2010). They also designed their own pre and posttest instrument based on the Jump\$tart Coalition's survey.

Both of these studies showed that playing the *Stock Market Game* had a positive impact on students' conceptual understanding of saving and investment. Students in the treatment groups outperformed students in the control groups by statistically significant margins in both studies. In the nationwide study (Hinojosa, et al., 2010), elementary students in the treatment group outscored the control group by 62 points (out of 550). The middle school difference was 42 points higher for the treatment group, and the high school treatment group outscored the control group by 36 points on the average. In the Kentucky study, results were similar. "The students in the test group performed much better on the *Stock Market Game* posttest than the students in the control group. The test group average was 64.36 while the control group average was 48.15. When they computed the *t*-statistic for a difference-of-means test, it was 6.49 which was statistically significant at the 0.01 level of significance" (Harter & Harter, 2010, pp. 27 - 28). This suggested that the combination of the *Stock Market Game* and the *Learning from the Market* classroom curriculum is an effective way to teach about saving and investing, especially in comparison to the other curricula available without a game component. Harter and Harter went further and also evaluated the differences in scores on sections of the test that assess more general understanding of finance that is not directly related to the stock market. While the pretest scores in this area were approximately the same at the beginning of the semester, the treatment group significantly outperformed the control

group at the end of the term, which suggests that this game can improve student knowledge in economics and financial literacy (Harter & Harter, 2010).

In addition the researchers in the national study computed the effect estimates of using the *Stock Market Game* in the classroom. Although the impact estimates varied in magnitude, all were statistically significant (Hinojosa et al., 2010). Younger student effects are estimated at about the same as similar classroom interventions expected. For middle school, it was slightly lower than average expected. For high school, it was higher than expected for a similar intervention. So, the effect estimate was indeed mixed. In an attempt to estimate if this tested difference had any impact upon behavior, the researchers also determined that game players were more likely to say they would buy bonds if given the chance (Hinojosa, et al., 2010).

Of those studies that evaluated student-learning outcomes, the results support the use of computer games in financial literacy education. Although the rigor of the studies varied widely, students who played the computer games were generally seen to improve their understanding of financial literacy subject material, and in studies that included a control group, the game-playing group out performed the control group on assessments. This finding aligns with other reports from institutions such as Wells Fargo that are testing online financial literacy education curriculum that includes computer games. The Wells Fargo/Visa Inc. Study showed that early credit education online had a positive impact on credit behavior. Two lessons plus quizzes increased awareness of the importance of building good credit. They then analyzed subsequent behaviors and outcomes such as bankruptcy to spending changes and use of revolving credit. The

treatment group showed improvement in credit responsibility vs. the control group. This was a college-aged group. They had also conducted earlier studies with similar results, reported in 2005 (Donnini et al., 2011). “One reason educational, online interventions can lead to such dramatic changes in behavior as seen in the Wells Fargo case study has to do with how people learn in an online environment, especially when that environment includes games, other competitive opportunities or potential interactions with peers” (Donnini et al., 2011, p. 2).

**Peer-to-peer learning.** The importance of interaction with peers as more expert guides in self-directed learning was highlighted also in DeVane’s study of discourse in a hip-hop discussion forum (2009). DeVane’s purpose was not to show that financial literacy learning occurs in these forums but rather to investigate how certain cultural subgroups use language as they interact and practice financial literacy in their daily lives. As a result of his study, DeVane was able to show how such groups develop a use of the specialized language and terms of personal finance and the financial system that is a bridge between their everyday linguistic and communication styles and the language of the financial institutional system. An understanding of the “discursive hybridity” (DeVane, 2009, p. 4) and the way participants in the hip hop subculture develop their financial identify can be used in development of financial literacy educational games to respectfully target this often-disenfranchised group, possibly leading to greater connections with financial institutions and resulting desired financial behavior.

## **Critical Stance on Financial Literacy**

DeVane's study casts a light on a couple of unexamined assumptions that are part of mainstream definitions of financial literacy. Financial literacy is generally assumed to be *personal* financial literacy, focusing on instilling in an individual the knowledge and skills needed to manage one's own finances or those of a household. This personal or domestic definition of financial literacy is reflected in the Presidential Advisory Council's proposed definition of financial literacy as "the ability to use knowledge and skills to manage financial resources effectively for a lifetime of financial well-being" (President's Advisory Council on Financial Literacy, 2009, p. 37). While this definition does not exclude an understanding of the workings and inequities of the financial system, financial literacy experts and educators have predominately focused on educating the individual to function within his or her own social context and make rational choices to ensure his or her own financial future. This orientation has generally been continued in the development of financial literacy games.

The problem with this orientation is the potential for limiting authentic practice and experimentation to only players from specific backgrounds - predominately middle-class professionals (or children on that life trajectory) - who will have access to the resources and strategies instantiated in the game. As simulated worlds, games are constructed from particular viewpoints, expressing particular ideas, offering players access to designed experiences (Squire, 2006). There is a real potential for game designers to be blind to the needs of people from a variety of cultures, socio-economic strata, and countries, and because of their limited viewpoint, they may design games that

exclude the experiences and financial strategies of different cultural groups.

Unfortunately, while game designers may intend to create a game that “will include most of the decisions that need to be made by today’s adults living in the real world” (Jones & Chang, 2012, p. 2), they are almost certain to be blind to the financial reality of some portion of the global economy.

**Discourse of financial literacy.** DeVane's study of hip-hop financial literacy discourse uncovered the boundary Discourse where hip-hop culture and discourse hybridized with the specialized language of finance. Participants in that study discussed personal finance situations, often giving one another advice and proposing strategies to manage spending and credit, but they did so using a blended language. Well-informed participants used specialized terms for financial or economic concepts to establish their expertise in personal financial management in conjunction with discourse associated with hip-hop music in order to maintain their position within that subculture. This study showed how people could use language in order to maintain their legitimacy as participants of hip-hop culture and also maintain an identity as financially literate people. They successfully negotiated an association with both their subculture and with part of mainstream culture.

The study done by Maynard et al. (2011) examined a very different relationship between a population and the language of personal finance. For the participants in the Doorways to Dreams study, the language, metaphors, and images employed by mainstream culture in talking about money were often very overwhelming and threatening. In order to develop computer games that would be engaging and

nonthreatening to people in this socioeconomic stratum, this study uncovered new language, metaphors and approaches to overcome fears, feelings of inadequacy, and guilt about financial situations so that women in poverty could playfully engage in financial literacy learning through online computer games that acknowledge the difficult tradeoffs that they must make in their daily financial lives.

**Socio-economic status.** Jones and Chang's new game, *Pecunia*, has the potential to model the experiences of people in lower economic strata. Their game allows for players to role-play working class people who decide not to get a higher education, allows for renting rather than home ownership, and potentially could model the result of poor choices or accidents (forgetting to eat, getting sick, losing income, getting arrested) that people in poverty must contend with. While players must be willing to explore these scenarios, this computer game does give them the opportunity to make choices that are more commonly taken by people in lower socio-economic situations. For some learners, these choices align with their background, giving them the chance to play a financial literacy computer game that does represent their reality. Other learners, however, could make use of *Pecunia* to explore the reality of people different than themselves by experimenting with choices made by (or forced upon) people in different economic strata. In this way, the game could be used to teach critical financial literacy as well as personal financial management.

**Power dynamics.** Maynard et al. (2011) report that low-income people might remain unbanked (i.e. have no relationship with a banking institution) in part because of their identity as low-income people and a lack of confidence in their ability to negotiate a



fair exchange with the more powerful institutions. For many lower-income people, the structure of banking institutions is a barrier to adoption of financially literate behaviors. Banks often require high minimum balances on accounts in order to avoid high fees for their services, which many low-income people cannot afford and cannot negotiate down to a manageable level. Hence, people in lower socio-economic strata often do not form relationships with the far more powerful institutions. As Maynard et al. (2011) noted, this lack of a banking relationship can seriously impact one's ability to fully participate in many aspects of financial literacy, including saving for the future and obtaining credit at a reasonable price. Part of the learning focus that Maynard and Doorways to Dreams aims to foster with their casual games is to aid their participants in becoming more confident in their ability to manage the uneven power relationship with financial institutions and find financial service providers to meet their needs.

One other study approached the issue of power dynamics in the financial system. In the *Virtual Economy*, consumers found that they can exert force on the system by banding together into consumer buying groups to get better services and pricing (Horton et al., 2002). This was not a designed feature of the simulation, emerging from the social interactions of the participants, which demonstrates how users can appropriate these simulated systems to meet their own needs and explore changing the power dynamics of an economic structure through organized, collaborative action.

**Rationality in financial decisions.** DeTar's mobile application was designed to track and provide feedback on the affective aspect of purchasing decisions, acknowledging that people often buy things that make them feel good because it makes

them feel good. Jones and Chang (2011) also mention “attitudes” as well as behavior and skills as being key components in shaping desired financial behaviors that will make people financially successful. Rather than preaching against this motivation in favor of purely rational, utilitarian decision-making, DeTar’s application was designed to record satisfaction with a purchase at the moment the decision was made and also upon subsequent reflection. The overall level of happiness with a prior purchase would then be presented when a similar purchasing decision was being contemplated as part of the decision-making criteria. Thus, happiness was elevated as a legitimate factor used in assessing whether or not to make a particular purchase. This shift toward acknowledging affective dimensions in financial choices is in line with current thinking on behavior change in other areas such as health management and smoking cessation. While economists and financial literacy educators want to think of human beings as rational actors, theorists are beginning to realize that habit and emotion play a large part in our decision making process.

**Age or life stage differences.** As Milevsky pointed out in his 2010 book on life stages, financial decisions and priorities differ depending upon the age of a person and his or her life cycle. While many mainstream financial literacy experts (eg. Lusardi, 2006) focus on a few key behaviors (such as saving for retirement and avoiding too much debt), Milevsky argued that people go through nine distinct phases during their financial trajectories. The *Financial Literacy Game in Teen Second Life* was designed to prepare teens for the next phase of their financial life as young adults. Participants in this game-like simulation were given the opportunity to choose a career or college, housing, and

transportation options. This allowed them to playfully imagine and explore the results of choices such as going to college vs. working immediately after high school. Plans for expansion would have addressed additional phases of the financial life cycle, extending into parenthood and retirement. This game took a critical stance on the “one size fits all” assumption in much of financial literacy education literature but encouraging students to look at the decisions facing them in the next and possibly subsequent stages of their financial life.

**Country differences.** None of studies explicitly addressed differences between various countries, and only one acknowledged that their assessment of financial literacy might not be appropriate if used in another culture. Certainly, no financial literacy computer game study addressed such important global financial topics such as micro-loans in developing countries, although some high level concepts regarding credit and repayment might translate from one context to another. Maynard et al. (2011) as well as DeVane (2009) were conscious of the importance of social context and appropriate use of culturally situated language. Jones and Chang (2012) reviewed financial literacy education levels in a number of industrialized countries such as the United States, Canada, Australia, and Hong Kong, but they did not draw comparisons between the subjects covered in each country nor indicate that any of these interventions introduce diversity in the context of financial literacy.

Several computer games were developed for use in countries other than the U.S. Financial literacy games have been used in Taiwan, Portugal, Canada, and the United Kingdom. One study mentions comic books being used as educational material by the

Reserve Bank of India (Holden, Kalish, Scheinholtz, Dietrich, & Novak, 2009), but at this writing, the researcher is not aware of any computer game that incorporates awareness that personal financial literacy differs from one country to the next.

Jones and Chang (2012) acknowledge that their pre- and post-test are based on how finance concepts are interpreted in Canada and rely upon that country's financial policies, which may not apply in other countries or regions. They suggest that the tests may need to be revised for other countries but do not address whether or not the game itself would need adaptation for other regions.

**Change in practices for the digital age.** Jones and Chang's new game, *Pecunia*, actually takes up the challenge of making sure that players learn the importance of checking one's balance and bank accuracy by reviewing digital records. Those players who do not pay attention may encounter bank errors and suffer consequences because of it. Significantly, these authors separated the need to monitor account balance accuracy from the routinely advocated practice of balancing a physical checkbook (National Endowment for Financial Education, 2006; O'Neill, 2008), encouraging students to understand the enduring concept while allowing them to adopt emerging practices using digital money management tools.

The majority of the other games also used digital account management tools, but they did not draw attention to fostering productive habits, allowing participants to assume that the financial system of their virtual game world was not subject to errors. If Ederly and Mollick (2009) are correct, business and banking will continue to move to use of digital and online tools with increasing frequency. While it is important for learners to be

confident and fluent with their use of these digital tools, financial literacy education may need to aid students in developing a critical stance on the assumed accuracy of financial systems.

## **Conclusion**

Computer games and digital media have already been shown to be useful in formal and informal financial literacy education. Designed computer games and virtual world experiences have been tested, with various levels of rigor, and have shown overall that these computer games are effective tools for financial literacy education. These studies give scholars and educators a foundation for future studies, particularly in subjects such as insurance and general economic concepts or financial literacy aspects (such as identity as a financially literate person), without yet exhausting the field for research. In many of the studies the authors acknowledge the continued need for expansion of design to address other topics (Liu et al., 2009; McClenaghan & Aslam, 2009) or aspects of financial literacy (Harter & Harter, 2010; Maynard et al., 2011; Osuri, 2011b). In many cases, they recognize the need to move beyond testing the computer game's functionality to assessing how well the game aids in development of financial literacy in the learners (Maynard et al., 2011; Osuri, 2011b; Ozercan, 2010; Stickel & Garcia, 2010).

A number of authors have noted that little is known about how the individual learner's social networks (Way & Wong, 2010) or communities of practice (Horton, et al., 2002) contribute to financial knowledge, attitudes, and behavior and suggest that situated learning, such as the proposed study would undertake, should be explored

(Horton, et al., 2002; Pereira et al., 2009). Both DeVane (2009) and the Doorways to Dreams Foundation studies (Maynard et al., 2011) have begun this work in examining how certain subgroups' discourse may provide a bridge or present a barrier to financial literacy learning and financially literate behaviors. The proposed study will continue this work in examining how participants in a virtual world economy are engaged in situated learning and practice as they create and run their amateur, virtual businesses.

The next chapter will introduce the setting for this case study, the virtual world of *Gaia Online*, as well as the participant who was a business owner in that world for five years. It will also explain the position of the researcher as a participant observer during this time period, and describe in depth the data collection, protection, and analysis processes.

## Chapter Three - Research Design

The following chapter provides an overview of the methodology involved in answering exploring how the development of a business in a virtual world facilitates the development of financial literacy among teen and young adult business owners.

Sub-questions that helped frame the inquiry were:

- What does it mean to be financially literate in *Gaia Online*?
- How does financial literacy in *Gaia Online* relate to other definitions of financial literacy?
- What business challenges trigger learning episodes in the virtual world?
- What concepts do virtual business owners use to frame their business activities and decisions?
- How do virtual business owners reflect upon and learn from their virtual world experience?
- How does experience in a virtual economy influence their confidence in managing personal finances?
- How does experience in a virtual economy influence the development of identity as a financially literate person?

### Research Method

Prior work in financial literacy education games has been done in 22 quantitative and qualitative studies. The quantitative studies have sought to establish the effect of educational interventions on the financial literacy of learners in both formal and informal

settings. In contrast, qualitative studies in financial literacy have been aimed at understanding the situated financial experiences of their target populations and give voice to the voiceless and powerless in keeping with the tradition of qualitative methodology (Tellis, 1997).

The quantitative studies have focused on assessing how an educational intervention - the financial literacy game - impacts student learning of a pre-defined subset of traditionally defined financial literacy subjects. These experimental studies have been conducted in educational settings to explain the effects of particular ludic educational activities and to evaluate financial literacy using measures and behaviors that are in alignment with established, mainstream concepts of what it means to be financially literate in our society. As was discussed in Chapter Two, these established conceptualizations of personal financial literacy are based on a worldview, along with resources and opportunities, which may not fit with the cultures and economic realities of people outside of the U.S. middle-class.

A few qualitative studies have begun to investigate how different social groups or subcultures define financial literacy, and what financial literacy means in their lives. Studies such as DeVane (2009) and Maynard et al. (2011) have started the process of understanding how people, particularly those marginalized by our society, think about money and their finances, how they manage their financial activities, and how they develop financial literacy. These qualitative studies continue the tradition of giving “a voice to the powerless and voiceless” (Tellis, 1997) and understanding particular, complex interrelationships between factors in their lives (Stake, 1995).



DeVane's study entered into the hip-hop subculture, and Maynard et al. (2011) are working with lower-income people in the United States. Both of these studies were undertaken in order to discern culturally appropriate themes and language to use in financial literacy computer games and, in the case of Maynard et al. (2011), to target skills and conceptual knowledge that would align with the financial realities of the target audience. This qualitative study followed a similar path by investigating how financial literacy develops in a naturalistic setting that appeals to young women, a group often considered particularly vulnerable to being financially illiterate (Lusardi, 2006), especially in marginalized socio-economic groups (Iliev-Piselli, Fadjo, & Lee, 2011).

### **Population and Setting**

In deciding where to explore the financial literacy learning of virtual business owners, the question of which virtual world to use naturally arises. Thus far, studies have used one of two strategies: 1) creation of a game or virtual world specifically designed for financial literacy education or 2) use of a game, virtual world, or social media designed for entertainment. For instance, games such as *Celebrity Calamity*, *Bite Club* and *Farm Blitz* by Doorways to Dreams Foundation are short, entertaining online games that focus on teaching players to maintain a sustainable balance between saving money for the long term and using credit responsibly. The *Stock Market Game* was designed in 1977 as a competitive team-based game used in classrooms to support formal learning of investment and savings. It now makes use of computers and the Internet as a means to retrieve information and communicate with players. Several financial literacy games are also being developed as mobile phone applications ("apps") so that learning can take

place anywhere and any time. While these apps are still in development and testing, games such as *Merry Miser* and *Bank-It* may be examples of the potential of learning offered at the moment learner players make decisions about how to spend, or save, their money.

Relying exclusively upon games and virtual worlds designed for financial literacy may not provide sufficient coverage to accomplish the mission of providing financial literacy education to all people. An unknown number of people, even among those who use the Internet regularly, may never seek out a game or educational site in order to learn about personal financial management. However, according to various estimates, a large majority of active Internet users will soon be engaged in some form of virtual world environment (Jarmon et al., 2009). Two separate financial literacy education programs made use of the entertainment-focused virtual world, *Second Life*, to design learning experiences for teens. The *Financial Literacy Game* (Liu et al., 2009; Ozercan, 2010) and *Financial Services Island* (McClenaghan, & Aslam, 2009) each focused on providing entertaining but informative experiences that introduced young learners to a wide variety of personal finance topics such as comparative shopping, credit, insurance, and the financial services industry. Other studies have shown that online games and virtual worlds designed purely for entertainment can support experiential, self-directed, and even transformative, learning (e. g., Gee & Hayes, 2010; Hayes, 2008; Hayes & King, 2009; Mitgutsch, 2011; Steinkueher & Johnson, 2009).

In some ways, leveraging these online games and virtual environments for educational purposes is an attractive strategy (Liu et al., 2009; Ozercan, 2010).

Designing and creating a computer game or virtual world for education requires significant resources, which pose a barrier to development (Harris, 2009), and it is not always certain that the result will be both engaging and educational (Baker, 2008). In addition, a continuing challenge in educational technology development and adoption is to develop a tool that will be in use longer than it was in production, available for use by enough educators to justify its development budget, and usable in a wide range of educational environments. This challenge is well illustrated by a number of computer games, reviewed in Chapter Two, which may not be put into production even after successful trials or that were deployed for a period of years but are no longer available for technical reasons.

To be used in research and education, a computer game or virtual world should not only be educational and engaging but needs to also allow “instructors and researchers the control they demand over their students’ and research subjects’ in-world experiences, and the flexibility to modify those experiences to suit their needs” (Bloomfield, 2009). This latter requirement has tended to direct educators, researchers, and learning technology development companies to focus on ways to improve authoring tools and create ways to allow users to generate content (Harris, 2009). Hence, much experimentation in educational technology currently centers on creating learning environments in graphically rich, 3-D virtual reality environments also known as virtual worlds.

A virtual world is a computer-simulated persistent environment (Liu et al., 2009) that is similar to the tangible world, although it may deviate from so-called real world

physical constraints (such as the ability of players to fly unassisted - see Figure 4). Virtual worlds are populated by many concurrent players (Bloomfield, 2009) who interact with the world and share common experiences with other players through virtual representations of themselves, which are called avatars (Liu et al., 2009). Communication between users is usually accomplished via typing and/or voice communication. In some virtual worlds, simulated body language, displayed on their in-world representation (avatar) can communicate simple ideas or emotions of the user.



**Figure 4: Researcher's Avatar in Second Life**

These worlds differ from computer games in that players (also called “users” or “residents”) are not given specific goals or objectives (Hornik & Thornburg, 2010), and there is no scoring mechanism or end state to pursue. Users usually are free to make complex decisions (Bloomfield, 2009) and have a wide range of options and activities they can pursue in a virtual world. Some virtual worlds, such as *Second Life* and *Active Worlds*, allow players to create objects in the world such as buildings, plants, and

clothing (see Figure 5). The combination of player agency and the ability of average users to create digital media in a multiplayer environment make virtual worlds attractive sites in which educators and researchers can design interactive, digital learning experiences.



**Figure 5: Educational Installation in Active Worlds. Source: The River City Project at Harvard University**

Graphical 3-D virtual worlds have their own limitations. *Second Life* is well-known for attracting initial visits from millions of people who elect not to return, often citing the steep learning curve required to navigate effectively, communicate with others,

and then to create one's own digital in-world content (Au, 2006). Studies have documented that even technology-savvy teens and young adults who experiment with *Second Life* may find other, less sophisticated environments more attractive locations for their creative and social activities (Johnson, King, & Hayes, 2008). "As Ted Castronova, social scientist and struggling educational game designer advises, going low tech may be sufficient to create a truly engaging game that will appeal to thousands" (Baker, 2008). Although some educational researchers cite 3-D graphics as an essential, engaging feature of games designed to attract children and young adults (McClenaghan, 2009), a less graphically intense, 2-D game can be successful (Harris, 2009).

**Introducing *Gaia Online*.** As an engaging, lower-tech alternative, *Gaia Online* (often called simply "Gaia") is a virtual world that has a rich and active virtual economy that is the foundation for a large number of amateur virtual businesses. With over seven million unique people logging into this world each month, 23 million total accounts, and more than 100,000 financial transactions in the Gaia economy taking place per day (Gaia Interactive Inc., 2011), this world has the potential to provide many users with informal learning and practice in finance and business principles. As an entertainment focused virtual world, like *Second Life*, it attracts a wide variety of people who interact with one another in authentic contexts, to buy and sell items in order to achieve their own goals. As such, this is an appropriate environment in which to study naturalistic behaviors (including informal learning).

Gaia's residents (who refer to themselves as "Gaians") earn virtual money (called "Gaia gold") through a variety of activities, such as roaming around the world, gathering

items, playing games, clicking on advertisements, and selling their virtual world items via the Marketplace. Enterprising residents have created additional ways to earn Gaia gold, through creation and sale of their own digital art creations, using *Gaia Online* (available at <http://gaiaonline.com>) as a location for interaction, trade, and display. These creations are not officially incorporated into the virtual world (although the exchange of virtual currency is conducted through Gaia's databases) but can be displayed to other Gaians in a variety of ways and become status symbols and indications of social connections and standing.

*Gaia Online*'s environment contrasts with that of graphical virtual worlds. Gaia employs a wide mix of text, static 2-D images, and Flash-based animation to form one of the most popular teen-age/young adult hangouts online ("Gaia Online Wins Best Website User Experience at the Mashable Awards at CES," 2011). It is more accessible than many competing virtual worlds, such as *Second Life*, since it is purely browser-based, which less expensive computers and low bandwidth Internet connections can handle. Since users do not need to download and install special software, *Gaia Online* can be run from any computer that a user can access the Internet, placing it in the same category as the casual games being developed by the Doorways to Dreams Foundation's financial literacy education games targeted to low-income players.

*Gaia Online* is also one of the online social communities that appeals more to females than males. According to *Gaia Online*'s staff economist (S. Golde, personal communication, April 15, 2010), 58.94% of its residents identified themselves as female, and 41.05% identified as male. Its users are also predominantly in their late teens





**Figure 6: Researcher's Avatar in *Gaia Online***

or college-aged. Residents reportedly born in 1993 or later (aged 18 or younger) comprise 42.95% of the virtual world population. Adding those who are college-aged (born in 1990 or later), the percentage increases to 72.03%. This is a demographic that tends to be less financially literate: young, female, and with less education, which makes a world such as *Gaia Online* an attractive location to study financial behaviors of this group, especially those who are actively engaging in the virtual economy.

As a long-term Gaia resident (who first entered the world in November 2005), the researcher has observed and participated in the *Gaia Online* economy and has seen first hand the creative ways in which teens and young adults create and manage businesses in virtual worlds. In an after-school program and through experience in participating as a resident, the researcher has conducted a pilot study of two teen-aged girls who created businesses in *Gaia Online* and *Teen Second Life* (Johnson, 2009). This study continued this research with a focused case study of a virtual business in *Gaia Online*.



Virtual businesses in *Gaia Online* operate in the text-based discussion forums where they market user-created digital artwork. *Gaia Online*'s original user base was (and largely still is) people interested in *manga*, a distinctive Japanese style of cartoons, comics, and animated films. Hence, there is a wide selection of virtual businesses, of various levels of success, selling and discussing digital media. These businesses are organized in sections of the discussion forums where each business maintains one or more related forums in which it conducts business and maintains a social network of its more devoted fans and customers. Successful businesses must continue to engage and attract customers, and maintain their interest, using a variety of techniques such as playing games, maintaining interesting discussions, running fan fiction or collaborative storytelling forums, using ways of displaying their digital merchandise, and continuing to create a product that is attractive to their niche market.

### **Participant for this Study**

The business owner for this case study has been purposefully selected from participants in a prior case study, based on several characteristics. The participant managed businesses that were successful, with an active customer base and regular sales. The participant had sequentially owned two businesses over the course of five years, which included discussion forum record data over time, which had the potential to indicate growth in understanding of financial concepts by the participant.

During the period of the case study, the participant, referred to in this study by the pseudonym "Nyght", ranged in age between 15 and 20. She was a high school student in

a small Midwestern city. After she graduated from high school, she entered college in a rural private college in the Midwest.

### **Position of the Researcher**

During the case study period, the researcher was a resident in Gaia Online and participated as a customer of the case study participant's business, using the screen name "christienjinn." As a customer, the researcher had access to the public sections of the business, including the guild space. The researcher participated in the shop's customer community but generally maintained a marginal position in community as a "lurker." Lurkers generally are peripheral members of an online group who primarily read the posts and discussions of the community, but they seldom contribute substantially to the discussion. The researcher occasionally participated in raffles, attempting to purchase a pet. She did eventually win the pet in Figure 11 below, but she did not use this pet to participate in the shop's role-playing or collaborative story writing activities.

### **Ethical Considerations**

The owner of the case study businesses is a person known to the researcher (see Author's Note below). Her real life identity and screen name have been kept confidential, and identifying details do not appear in the dissertation. Throughout this case study, she is identified by the pseudonym that she chose as her identifier.

A portion of the data includes observations of public behavior by the researcher, and in some cases, data analysis includes responses by the participant to communication by other members of the virtual world community. The identity of these participants has remained confidential, and in most cases, the researcher does not know the legal identity

of participants. Throughout the study, shop customers and other residents are referred to simply as “customer” or “resident” in order to protect both their real life and virtual world identities. Details of the businesses, such as name and exact descriptions of the digital media that the business produces and sells have been redacted. This business is one of many similar businesses in *Gaia Online* and is no longer in operation at time of writing; hence it is unlikely that anyone would be able to identify the business.

**Author’s note.** The owner of the virtual company that is the focus of my case study is my daughter. The idea for the dissertation arose as I simultaneously watched her develop her business in one virtual world while also working with teens that were creating virtual businesses in a second virtual world as part of an out-of-school computer club. That they all decided to run virtual businesses to sell their digital creations was an interesting development in itself; that these businesses were the impetus for extensive, deep, and committed self-directed learning episodes suggested that there is important finance learning - as yet undocumented - occurring in the virtual commerce of these open-ended virtual worlds.

The computer club ended, but I continued to observe my daughter’s activities in the virtual economy of *Gaia Online*. Being in this privileged position for five years allowed me a unique perspective. I had an opportunity to observe a young learner and her environment in greater detail than is usually possible when conducting a study of online experiences. I can be certain of many of the details of her life, know her family and educational background, and have at least partial information about factors that influenced her learning outside of the virtual world experience. Often, those of us who

study online learning cannot even be sure of the gender or ages of our participants and respondents; so I am well aware that being close to the research subject grants me an unusually rich research experience normally reserved for ethnographers in the physical field.

This closeness to the data, however, brings its own price. Although many qualitative researchers struggle with the difficulty of establishing an objective, evaluative stance in analyzing the situations in which they have been themselves participants, this research was particularly open to analytic bias on my part. Hence, any arguments I made for informal learning in this study were triangulated, by using interviews, text from the online forums, digital media created by the participant, and learning materials consulted by the participant.

As a research participant, my daughter, more than most, was likely to tell me what she thought I wanted to hear. In educational research, this is often a risk, however. Students tend to want to please their teachers, and so we need to gather data from multiple sources in order to triangulate results. Hence, I also used the written records of five years of online interactions as a historical record that documents successes, challenges, strategic moves, and even failures that occurred during operation of this amateur business.

My privileged position also brings some minor risks to my daughter. Unlike other case studies, the identity of the research subject cannot be kept confidential. However, details about the online business were redacted so that no one knows which, of the hundreds of similar businesses, she ran during the study period. The business in question

also cannot be harmed by this study or the results when published since it was closed at the time the dissertation was written. Throughout the operation of the amateur business, the research subjects were careful not to violate the terms of service of the virtual world, and while some practices were slightly innovative, none are so unique as to neither identify the business nor pose a legal risk.

In light of the potential exposure of her real world identity in connection to this study, I have asked and received her permission to use her businesses as the case for this project. Although she has moved on to other pursuits, as she says, she is “proud of her Gaia shop.”

### **Strategy of Inquiry - Case Study**

This study was conducted as an instrumental case study. According to Stake, the instrumental case study is one in which we seek to answer a research question through studying a particular case (1995). The case study method is often used to answer research questions that begin with “how” or “why” (Tellis, 1997), exploring something or someone in depth (Creswell, 2009; Jones & Chang, 2012).

Different authors have proposed various foci for case studies. A case study may focus on a system of action (Stake, 1995; Tellis, 1997), a program, event, activity, process, or individuals (Creswell, 2009; Chang & Jones, 2012). The focus of the case study (often referred to as “the case”) is recognized to be part of and interact with a larger social situation or context (Stake, 1995; Tellis, 1997). While the case study focuses on describing the particular case, part of its complexity and usefulness in answering the research question is on understanding how the case relates to the circumstances and

systems in which it exists (Stake, 1995). Hence, while the subject of a case study is bounded, it is not isolated from its context. The aim of a case study is a holistic understanding of the case itself, focusing on establishing what is particular or unique about it rather than striving to generalize to other, similar cases (Stake, 1995; Tellis, 1997).

**Appropriateness for proposed study.** According to Creswell (2009), the case study is valuable in exploring a process in depth. In this study, the process is the development and exercise of financial literacy in a virtual world through running a business. The case specifically focuses on the financial literacy development of a particular business owner, which bounds the study in time and (virtual) location.

The research question is also one that fits Creswell's guidelines for case study research. Beginning with the word "how", it explored the process of development and of financial literacy in a particular virtual world business.

The unit of analysis is very important in establishing a case study (Tellis, 1997). For this study, the case is a particular business owner in the target virtual world, *Gaia Online*. According to Tellis, single case study design is appropriate when no other cases are available for replication, when the case represents a unique or extreme example, or when the observer has access to a phenomenon that was previously inaccessible (1997). Stake (1995) seems to focus on the single case as the essence of a case study. In this instance, the focus on a single case is necessary because of the difficulty of recruiting another virtual business owner in this space, especially one who can provide equally rich and detailed accounts of the experience and learning opportunities found in creating and

managing a shop in this virtual world. Other researchers in virtual worlds have also focused on a single participant's learning trajectory in order to obtain a rich, descriptive narrative of the situation and process (e.g. Hayes, 2011). While use of a single case requires particular care, the richness of the data gathered over an extended period of time (five years) and resulting deep description argue for its appropriateness in this situation.

**Types of data.** The types of data that were gathered for this case study included observations by the researcher as a participant observer in the shop forums and the *Gaia Online* virtual economy, email conversations with the participant, public discussion forum posts associated with the shop, images and digital artifacts offered for sale in the shop, item valuation data, and interviews with the participant. Data also include information from support sites, such as [tektek.org](http://tektek.org), that are publicly available to anyone with an account in *Gaia Online*. Since the forum posts that constitute the activity of the shop and related community are persistent, once the shop for the case study was identified, the historical data in postings from approximately five years were used in analysis. The main activity centers were discussion forums that were open to the *Gaia Online* public. The variety of sources of information aided in validating the findings through triangulation (Tellis, 1997).

**Data collection.** Semi-structured interviews were conducted face to face or via Skype and recorded, using the third party Skype Call Recorder, with permission of the participant (see list of questions below). These were selectively transcribed for salient topics by the researcher.

Email exchanges within *Gaia Online* are persistent and were used with permission of the participant. These were downloaded from *Gaia Online* and saved as text files.

The researcher kept observational notes during the period of the case study, recording her field notes both in a hand-written journal and in text files. The journal notes were typed and added to the text documents for analysis. Images were also captured during the case study and saved for analysis.

The public “shop” portion of the case study business is open to anyone with a *Gaia Online* account. To keep a persistent record of the discussion forum posts, they were “printed” to PDF format, which captures the discussion text *verbatim*, discussion sequences between residents, and associated artwork and images. Page layout and formatting was also partially captured in sufficient fidelity for this case study analysis.

Once data had been downloaded from *Gaia Online* and transcripts made from interviews, all digital files were imported into NVivo 9 for thematic analysis.

**Confidentiality and data protection.** The participant in the study was identified by a code that was used to tag the interviews and interview transcripts. The codes were associated with the online avatar pseudonym in a file that was kept in a locked cabinet and stored in a different location than the interview recordings and transcripts. Note: online avatar pseudonyms were treated as if they were the names of the research subject, although technically they are not "real" identities, they represent a substantial investment and identity of the subject and will remain confidential.



All recordings, transcripts, interim coding files, and subject code-id files will be kept in a locked cabinet in the researcher's locked office. The file containing the link information between subject and ID code will be kept in a separate file cabinet in that office. Computer files during processing will be kept on a computer kept in that office, which is password protected. The files will be kept for two years, at which time, the paper copies will be shredded. Computer files will be securely deleted.

**Interview questions.** Interviews were semi-structured and conducted in person or via Skype after permission for the interview was obtained. The questions asked during the interview included the following, although follow-up questions arose during the course of the interview as participant suggested lines of inquiry. In addition, the participant was asked to reflect upon relevant episodes relating to business and financial literacy learning found in the public discussion forums.

The following questions were pilot tested in a prior study, and minor changes made to increase comprehension in the participant.

The participant was able to choose not to answer any question.

- What motivated you to create your business?
- When did you start your business and how?
- How did you get started?
- Can you describe for me what your business does or sells?
- How do you market your product?
- How do you decide what to charge for your product?
- Why do you think customers like your products?

- Is your shop typical? What makes you unique?
- Who else runs the shop with you? What do they do?
- What challenges have you faced since you started?
- How did you overcome them? What did you learn from the challenges?
- What do you think you have learned from running the shop?
- Have any school classes helped you with the shop?
- What other ways do you learn to be successful with your business?
- Are you successful? (Listen for what they think are markers of success and follow-up)
- What would you tell a newbie to do if they wanted to start a shop of their own?
- What do you think a newbie needs to understand about the economy or markets to succeed in *Gaia Online*?
- How does the virtual shop relate to your non-Gaia life?

**Data analysis.** Data analysis began with detailed descriptions of the virtual world *Gaia Online* and the operation of the digital media sales businesses that operate within it, both programmed features and social interactions. The researcher then made transcripts of data gathered in audio or audio-video form and read through all material to look for obvious errors in transcription or recording. The participant reviewed the interview transcripts for accuracy before analysis. The interviews were read through and coded using both a priori and emergent themes. Themes were developed from the financial

literacy subjects and types of knowledge identified in the literature review and used to analyze how traditional financial literacy concepts and skills are found in the virtual world data. Emergent themes were also developed during data analysis to give voice to the participant's understanding of financial literacy.

The discussion forum data were then gathered and organized by date. These data were downloaded in portable document format (PDF) in order to partially preserve the formatting of the web pages, including avatar appearances at time of download and other artwork. The data were read through once in their entirety to create a timeline of events associated with the businesses. Events included creation and closing of businesses, periods of absence by the owner, rapid changes in forum activity level, planned shop events, changes in product line, changes in staff, and other time points identified by the participant during the interviews.

Discussion posts were then entered into NVivo for selective coding. Posts were chosen for coding based on events and patterns of posting noted during the initial read through of the forum data. These sections of the discussion forums were coded by themes. Themes included those developed during the creation of the literature review and analysis of the interview data as well as emergent themes developed during coding of the forums. The coding scheme overview is shown in Figure 7, and the abbreviations are expanded in Table 5.

Themes based on financial literacy concepts and types of understanding identified in prior studies of financial literacy computer games were most frequently identified in

this case study data. The detailed NVivo coding scheme for each of these sub-codes is shown in Figures 7 and 8 below. These findings will be explored in detail in Chapter 4.

Name	Sources	References	Created On	Created By	Modified On	Modified By
bc	45	75	2/14/2012 3:51 PM	BZJ	4/20/2012 1:31 PM	BZJ
case description	24	82	2/16/2012 9:39 AM	BZJ	4/20/2012 1:43 PM	BZJ
confidence	15	20	2/14/2012 3:53 PM	BZJ	3/19/2012 4:50 PM	BZJ
critical	7	9	3/15/2012 4:10 PM	BZJ	4/20/2012 1:37 PM	BZJ
eflc	16	25	2/14/2012 3:50 PM	BZJ	4/20/2012 1:47 PM	BZJ
eflu	7	13	2/14/2012 3:50 PM	BZJ	3/19/2012 11:07 AM	BZJ
formal learning	4	7	2/20/2012 4:33 PM	BZJ	3/22/2012 12:33 PM	BZJ
frame	13	31	2/14/2012 3:51 PM	BZJ	4/20/2012 9:30 AM	BZJ
IT and CS Skills	27	36	2/16/2012 12:09 PM	BZJ	4/20/2012 1:34 PM	BZJ
later	5	10	2/14/2012 3:54 PM	BZJ	4/20/2012 10:59 AM	BZJ
le	27	54	2/14/2012 3:51 PM	BZJ	4/20/2012 1:31 PM	BZJ
lit review concepts	85	290	2/14/2012 3:47 PM	BZJ	4/20/2012 9:17 AM	BZJ
lit review understanding	41	121	2/14/2012 3:48 PM	BZJ	4/20/2012 9:17 AM	BZJ
reflect	8	9	2/14/2012 3:51 PM	BZJ	4/7/2012 11:09 AM	BZJ

**Figure 7: Codes Used in Nvivo During Data Analysis**

A keyword search was also performed to isolate references to subject domain information associated with financial literacy. Using NVivo, text search queries were run on keywords, searching for exact word matches and words with similar stems. Identified sections of data were then examined for accuracy before coding, since this method generated a large volume of positive results in which the word was used in a context other than financial literacy.

**Table 5: Overview of Code Abbreviations and Codebook**

<b>Code</b>	<b>Explanation</b>
Bc	Business challenge encountered
Case description	Details about the case study participant, her businesses and <i>Gaia Online</i>
Confidence	Self confidence in running business and managing finances
Critical	Critical reflections upon financial literacy topics or situations encountered
Eflc	Emerging themes regarding financial literacy concepts
Eflu	Emerging themes regarding financial literacy understanding
Formal learning	Comments upon formal education regarding finances and economics
Frame	What concepts do virtual business owners use to frame their business activities and decisions?
IT and CS skills	Theme used in prior study regarding information literacy
Later	Theme used to identify potential points for re-examination or future study
Le	Learning episode
Lit review concepts	Themes relating to mainstream conceptualization of financial literacy
Lit review understanding	Themes relating to understanding taxonomy
Reflect	How do virtual business owners reflect upon and learn from their virtual world experience?

Keywords included:

- Save
- Credit, debt, borrow, and loan
- Interest
- Income
- Budget
- Insure
- Purchase
- Feedback

- Money
- Class
- Invest
- Cash

Some terms, such as “gold” appeared too frequently in the data to be useful as search terms, generating multiple results per page.

Name	Sources	References	Created On	Created By	Modified On	Modified By
bc	45	75	2/14/2012 3:51 PM	BZJ	4/20/2012 1:31 PM	BZJ
case description	24	82	2/16/2012 9:39 AM	BZJ	4/20/2012 1:43 PM	BZJ
confidence	15	20	2/14/2012 3:53 PM	BZJ	3/19/2012 4:50 PM	BZJ
critical	7	9	3/15/2012 4:10 PM	BZJ	4/20/2012 1:37 PM	BZJ
eflc	16	25	2/14/2012 3:50 PM	BZJ	4/20/2012 1:47 PM	BZJ
eflu	7	13	2/14/2012 3:50 PM	BZJ	3/19/2012 11:07 AM	BZJ
formal learning	4	7	2/20/2012 4:33 PM	BZJ	3/22/2012 12:33 PM	BZJ
frame	13	31	2/14/2012 3:51 PM	BZJ	4/20/2012 9:30 AM	BZJ
IT and CS Skills	27	36	2/16/2012 12:09 PM	BZJ	4/20/2012 1:34 PM	BZJ
later	5	10	2/14/2012 3:54 PM	BZJ	4/20/2012 10:59 AM	BZJ
le	27	54	2/14/2012 3:51 PM	BZJ	4/20/2012 1:31 PM	BZJ
lit review concepts	85	290	2/14/2012 3:47 PM	BZJ	4/20/2012 9:17 AM	BZJ
buy	16	31	2/14/2012 3:48 PM	BZJ	4/20/2012 1:44 PM	BZJ
credit	10	12	2/14/2012 3:47 PM	BZJ	4/20/2012 9:41 AM	BZJ
econ	6	16	2/14/2012 3:48 PM	BZJ	3/19/2012 10:54 AM	BZJ
entrep	44	91	2/14/2012 3:47 PM	BZJ	4/20/2012 1:20 PM	BZJ
finsys	19	29	2/14/2012 3:48 PM	BZJ	4/20/2012 1:31 PM	BZJ
income	21	35	2/14/2012 3:47 PM	BZJ	4/20/2012 1:04 PM	BZJ
insure	0	0	2/14/2012 3:48 PM	BZJ	2/14/2012 3:48 PM	BZJ
invest	11	31	2/14/2012 3:47 PM	BZJ	3/19/2012 4:37 PM	BZJ
mm	21	31	2/14/2012 3:48 PM	BZJ	3/23/2012 10:49 AM	BZJ
save	11	14	2/14/2012 3:47 PM	BZJ	3/19/2012 11:12 AM	BZJ
lit review understanding	41	121	2/14/2012 3:48 PM	BZJ	4/20/2012 9:17 AM	BZJ
reflect	8	9	2/14/2012 3:51 PM	BZJ	4/7/2012 11:09 AM	BZJ

**Figure 8: Detailed View of Concepts Sub-Coding**

Structuring the evolution of the case study business through time and across multiple sources of data increased the validity of learning themes, since they appeared in a variety of data capture modes. The keyword search increased coding accuracy over the large corpus data gathered over five years.

**Table 6: Coding Detail for Concepts**

Code	Explanation
Buy	Purchasing
Credit	Credit, debt, or paying in installments
Econ	Economics concepts
Entrep	Entrepreneurship and business management
Finsys	Financial system – real world or virtual world systems
Income	Earning money
Insurance	Insurance of items
Invest	Investment purchases and decisions
Mm	Money management and budgeting
Save	Saving money

Finally, the themes and findings were checked with the participant in a follow-up interview to validate them, as is recommended in case study methodology literature (e.g., Creswell, 2009; Tellis, 1997).

The screenshot shows the NVivo software interface with the following data table visible in the main window:

Name	Sources	References	Created On	Created By	Modified On	Modified By
bc	45	75	2/14/2012 3:51 PM	BZJ	4/20/2012 1:31 PM	BZJ
case description	24	82	2/16/2012 9:39 AM	BZJ	4/20/2012 1:43 PM	BZJ
confidence	15	20	2/14/2012 3:53 PM	BZJ	3/19/2012 4:50 PM	BZJ
critical	7	9	3/15/2012 4:10 PM	BZJ	4/20/2012 1:37 PM	BZJ
eflc	16	25	2/14/2012 3:50 PM	BZJ	4/20/2012 1:47 PM	BZJ
eflu	7	13	2/14/2012 3:50 PM	BZJ	3/19/2012 11:07 AM	BZJ
formal learning	4	7	2/20/2012 4:33 PM	BZJ	3/22/2012 12:33 PM	BZJ
frame	13	31	2/14/2012 3:51 PM	BZJ	4/20/2012 9:30 AM	BZJ
IT and CS Skills	27	36	2/16/2012 12:09 PM	BZJ	4/20/2012 1:34 PM	BZJ
later	5	10	2/14/2012 3:54 PM	BZJ	4/20/2012 10:53 AM	BZJ
le	27	54	2/14/2012 3:51 PM	BZJ	4/20/2012 1:31 PM	BZJ
lit review concepts	85	290	2/14/2012 3:47 PM	BZJ	4/20/2012 9:17 AM	BZJ
lit review understanding	41	121	2/14/2012 3:48 PM	BZJ	4/20/2012 9:17 AM	BZJ
app	16	33	2/14/2012 3:49 PM	BZJ	4/20/2012 1:21 PM	BZJ
behave	11	23	2/14/2012 3:49 PM	BZJ	4/20/2012 12:53 PM	BZJ
concept	5	10	2/14/2012 3:49 PM	BZJ	4/20/2012 9:40 AM	BZJ
exp	14	19	2/14/2012 3:49 PM	BZJ	4/20/2012 1:11 PM	BZJ
fininst	8	12	2/14/2012 3:50 PM	BZJ	3/28/2012 9:11 AM	BZJ
id	17	24	2/14/2012 3:50 PM	BZJ	3/19/2012 4:50 PM	BZJ
reflect	8	9	2/14/2012 3:51 PM	BZJ	4/7/2012 11:09 AM	BZJ

**Figure 9: Detailed view of Understandings Sub-Coding**

**Table 7: Detailed Coding for Types of Understanding**

<b>Code</b>	<b>Explanation</b>
App	Application
Behave	Behavior
Concept	Concepts
Exp	Experience
Fininst	Relationships to financial institutions
Id	Identity

### **Conclusion**

In the next chapter, study findings are presented including a detailed description of the case, starting with the virtual world, the section of this world in which user-created art is sold, and then the case study participant and her businesses. This is followed by analysis of what financial literacy is in this virtual world, how this compares to financial literacy learning in other virtual world financial literacy studies. The subject domain and understandings model developed in Chapter Two are used to frame detailed exploration of how financial literacy in *Gaia Online* compares to current understandings of financial literacy in the real world, and how experiences and reflection of the case study participant relate to development of financial literacy. At the end of the chapter, a proposed revision to the subject domains of financial literacy is proposed based on the importance of fluently negotiating intellectual property agreements in an economy built upon this type of property.



## Chapter Four – Findings

### Description of the Case

In keeping with recommendations for case study research (Creswell, 2009; Stake 1995), the findings chapter begins with a detailed description of the case for the study. In order to understand the case study participant and her businesses, this description will begin by describing the virtual world of *Gaia Online*. This detailed description of the virtual world itself is necessary because, unlike the more commonly known world *Second Life*, it has not been featured in prior academic studies of virtual worlds and their use in educational endeavors. The only known academic study to describe *Gaia Online* was done by Saar Golde, who focused his attention on a narrow feature of the virtual world's item auction system (2008). This case study describes the other type of market that exists in parallel, the user-created art market, which operates in an entirely different section and with distinctly different behaviors and patterns.

Following this general overview, the description of the case will focus on describing the business owner and business that are the specific focus of this case study. This description will include explanation of the type of activities and products associated with operating this amateur business in the virtual world and the ways that business operators appropriate the tools of a discussion forum, similar to those of learning management systems like *Moodle*, to establish a business that appeals to art collectors and collaborative story-tellers. The detailed description is built primarily from observations made by the researcher during her participation as a resident of *Gaia Online* for more than five years as well as interviews with the participant.

After the description of the case, discussion will turn to addressing each of the research questions in detail. The analysis in this portion of the chapter is based primarily upon interviews with the case study participant and analysis of the discussion forum posts that comprise the activity of the participant's business.

**Location of the case study in *Gaia Online*.** As a virtual world, *Gaia Online* is quite complex, which may be a reason it has not been studied up to this point. It is difficult to pin down exactly what it is because it incorporates so many different activities and features that it defies adequate description in a few short sentences. While many virtual worlds and video games (especially multiplayer, online games) are the center for a community and player-created media (such as artwork and mods), *Gaia Online* pulls these features all together into a single, loosely integrated entity. It combines text-based and graphical communication elements, solo and multiplayer games, interest-based communities, peer rating and criticism of user-created work, a narrative story about the world itself, comic strips, a complex dual-currency economy, an achievement and quest system, and a place to keep an online journal. It seems to be an ideal social networking site for teen and young women as well as fans of *manga*-style artwork.

The world is a popular online hangout for teens and young adults who can socialize via text-based chat or online discussion forums. They can also participate in combining visual elements to create a variety of socially available displays such as decorating their avatar (which is their visual representation in the world), a house, a car, and an aquarium. Residents of this world can pursue their interests and socialize along the spectrum described in Ito et al. (2009). Residents of *Gaia Online* can choose among

many different types of social interaction and activities and still legitimately belong to the community. Gaians may simply hang out (the most casual level) by reading and posting in the forums, mess around by combining various items to modify their visual representations, or geek out by creating and displaying their *Gaia Online* related artwork.

One obvious feature of this virtual world is the ability to collect a wide range of cute, digital items for use in decorating and display to show one's taste, position and skill in the virtual economy and games, and social grouping within sub communities. In addition to customizing an avatar etc, a resident can also use their forum signature line to display user-created art and indicate affiliations and membership in various *Gaia Online* interest groups and communities every time they write a post in the discussion forums. This virtual world gives them a great deal of opportunity for development and display of identities and group affiliations.

Given the limitations of the system, however, avatars cannot be turned into overly sexualized Barbie-doll clones. Both genders are obviously pre-pubescent, and the alternatives are usually non-human, such as trees, animals, and robots. While much of the draw of *Gaia Online* is to play a version of dress-up dolls, this game limits the imagination to nearly Victorian propriety while keeping with its signature Americanized *manga* style of artwork. The characteristic facial features (for instance large eyes), a tendency to portray youthful, innocent characters, and the use of stylized artistic conventions (Bryce, Barber, Kelly, Kunwar, & Plumb, 2009) harken back to the origins of this virtual teen hang out as a place to share, discuss, and rate *manga*-style art, comics, and *anime*. While the artist style and use of *manga*-style comics to share the official

*Gaia Online* narrative remain, the world has evolved substantially since it was first introduced in 2003. Now, in addition to dressing up one's avatar, a resident can also use a house, a car, and an aquarium to display their particular interests and tastes. Customization of a resident's appearance and associated visual displays is limited to using digital art created by *Gaia Online*'s developers. This collectable art is the backbone of the *Gaia Online* official markets and part of the company's revenue stream. Official *Gaia Online* items can be earned or purchased in a variety of ways. Low-value items may be awarded during daily chance drawings or earned by playing some of the official, casual *Gaia Online* games.

*Gaia Online*'s economy is quite complex and uses two parallel types of currency: Gaia gold (called "pure" by residents) and Gaia cash. Items can often be purchased with one form of currency or the other but not both, although there are some exceptions that can be purchased using either form of currency. Gaia gold is easily earned in the virtual world in small amounts by engaging in routine activities such as posting in the forums, clicking on the daily chance wagons, voting on best avatar appearance, or selling items that the resident owns. Gaia cash, on the other hand, is either purchased using government issued currency, such as U.S. dollars, or accessing advertising material from various sponsors. At this writing, U.S. \$5 can be used to purchase 500 Gaia cash. In addition, there is a thriving barter system in *Gaia Online* that will be described in more detail below.

Items are primarily valued based on scarcity. Low-valued items are given away daily by chance or by taking part in casual activities, such as watching streaming video

advertisements or playing games. Higher valued items must be purchased from *Gaia Online*'s own shops via their official resident-to-resident Marketplace, which functions much like a version of eBay. Golde's paper refers to this as a list-order market (2008). Official *Gaia Online* items are essentially commodities - all instances of a particular thing (such as an angelic halo) are identical; hence there is no need or opportunity to distinguish one from the other in terms of quality. The highest valued items (monthly collectables and evolving items) are sold for U.S. dollars for a limited time, keeping supply low and encouraging subsequent trading and sale at relatively high values. With the evolving items, part of their charm and value is the uncertainty surrounding the forms they will take in following months, leading to a speculation market.

Keeping track of the current and projected value of the high-valued *Gaia* items led to the creation of market-trend analysis tools. These analysis tools mine the *Gaia Online* Marketplace sales information, keeping track of average prices for items and providing historical trend information. So, a customer who might be contemplating investing in a particular item could check the average price in the Marketplace currently as well as access information that would show that the price of the item has been increasing over months in order to decide that this would be a good investment for her at this time.

At first, these market analysis tools were provided only by an outside fan-created website (tektek.org), but *Gaia Online* later created its own trend analysis tools, which strongly resemble those used in the financial services industry, particularly stock price trend reporting sites. These show not only current price and trends but also sales volume

for each item available in the Marketplace.

### Princess Kaguya (Any)



Figure 10: Gaia Online's Market Analysis Information

**User-Created digital art market.** *Gaia Online* attracts a large number of individuals interested in textual and visual digital media production. Many of these individuals use *Gaia Online* as a location to display their creativity, receive ratings and feedback on their work, and collaborate in creating fan fiction or text-based narrative role-playing communities. In some of these communities, the collection of digital artifacts goes beyond the purchase and sale of official *Gaia Online* merchandise to include sale and trading of user-created art. This is a practice that *Gaia Online* encourages, listing it as a suggested way to earn Gaia gold ("Learn to Earn", 2012).

The user-created art is stored outside of *Gaia Online's* web site, often at free photo and art sharing sites such as Photobucket and deviant art. Links to these sites are used to enable the display of owned art within text forum posts or in the signature lines of

Gaians. Since the user-created art exists outside of *Gaia Online* and is the property of the shop owners, some shops sell custom art for real money. Toward the end of this case study period, Nyght had begun to accept real life art commissions as well, making initial contact with potential customers in her *Gaia Online* shop but then moving the negotiation process outside of Gaia's communication channels (discussion forum posts and local email system) in order avoid violating the terms of service agreement of this virtual world.

**Breedable pets forums and shops.** The setting for this case study is in a very small section of *Gaia Online* that is host to an "artistic community" (Nyght, interview, February 7, 2009) interested in user-created digital artwork. With seven million unique participants accessing this virtual world per month, there are many hundreds of forums and groups that write collaborative fiction, engage in online role-play, and discuss a wide variety of topics.

The breedable pets forum businesses focus on creating a selective breeding simulation in which mated pairs give birth to litters of two to three cubs, the offspring inheriting traits from the parents. In some cases, the simulation rules created by the business owners can involve dominant and recessive traits and the probabilities that offspring and descendants will inherit specific appearance traits. In general, the simulation management is done entirely through text-based negotiation and, possibly, the roll of dice. During the case study, *Gaia Online* developed a random dice-rolling feature that was used by residents to manage role-playing simulated battles and manage chance events.

Each business in this forum operates on a spectrum of varying degrees of user-participation. Some businesses restrict their operation to impersonal art sales, others require extensive commitment to frequent, ongoing participation and role-playing via text postings, and many operate somewhere between these two extremes. As a whole, the shops in this section of *Gaia Online* form their own meta-community and maintain loose standards for behavior throughout this section. For instance, copying the art of another, or even a very close approximation of a concept, may result in unofficial shunning by the community as a whole, making it impossible for the shop to compete and survive.

Generally, customers can interact with one another and with shop owner(s) either by contributing to the collective stories in character as one of the pets or casually in general discussion forums as themselves. Keep in mind that each piece of art is unique. Buying these pets is more like going into an art gallery and purchasing a hand-painted water color than heading to Target to pick up one of a dozen identical prints. For shops and customers, these sales are entertainment events in their own right, and the forums have devised a number of ways to sell their artwork. In some cases, the customer buys a piece of art that he or she can view online before purchase. But the customer may also be able to buy or negotiate customization of a desired pet or purchase the right to have one custom colored to specification.

Pets are sold to customers in one of four ways. The first method, the flat sale, is quite simple. The shop owner has a number of unique pets already created and announces that they will be sold at a certain date and time and for a set amount of gold. When the sale commences, each potential buyer posts which of the pets he or she desires,



and the first poster for each one offered successfully buys the pet. These types of sales are first-come first-served, and favor people who have fast computers and who have time to be present when the sale starts. In large shops, a flat sale can take place in literally seconds. In the smaller shops, one might run for an hour.

The sale is finalized when the buyer sends the seller a trade request, exchanging the money. The seller acknowledges the sale by listing the buyer as the owner of the pet on the pet list page of the forum. Usually, the seller also creates a certificate of ownership, listing the new owner's online name, the pet's new name, and any other details used in that shop, such as parents of the pet (if known) and perhaps a description of the pet's personality.

For more complex or rare pets, raffles take place instead of flat sales. In this case, customers who want to participate buy tickets for Gaia gold, sending the seller gold through the trading system. In the case study, each ticket cost 100 Gaia gold. The seller then posts each potential buyer's name alongside his or her ticket number(s). The sale commences when the seller, using the *Gaia Online* role-playing dice system, rolls a random number and the winning ticket holder receives the pet.

Some businesses run a modification of the raffle, called a flaffle. Each participant in a flaffle announces that he or she wants a ticket, and everyone gets one and only one ticket, which is free. The seller records ticket numbers for each participant. When the sale takes place, a dice roll determines who has won the right to buy the pet, which is then sold to the buyer at the shop's standard per-pet sale price. Shop owners who prefer the flaffle instead of the flat sale choose it because this method allows users with slow

computer connections, or who cannot be present at the time the sale starts, to have an equal chance to buy a pet. These sales can last for a day, giving everyone an opportunity, even if they have an odd schedule or are from a different time zone.



**Figure 11: Example of a custom pet owned by the researcher and used with permission of the creators**

Auctions are the third way that sales occur in these user-created art forums. They are usually reserved for rare or custom pets, but they may also be used to sell the rights to line art and even whole businesses. Auctions function in the virtual world in much the same way that they do in the real one. The item for sale is displayed, and potential buyers place their bids. Bids are usually public, but they can also be sent to the seller in a private message, creating a sealed bid.

Since auctions are usually for fairly expensive pets, they can involve more complex systems of exchange than flat sales, raffles, or flaffles. If a buyer does not have enough liquidity in the form of “pure” Gaia gold, he or she can create bids that include

owned official *Gaia Online* items. The exchange value of these items is determined by a neutral party or by referencing their current value as estimated by the Marketplace's average value for the item on that date. Hence, a buyer can put up inventory items in exchange for a user-created item during an auction. If the buyer has the winning bid, the items are sent to the seller via the trading system, which is the same transaction system used to exchange gold.

At this writing, players cannot exchange Gaia cash, and they cannot convert Gaia cash to gold directly or exchange it for government-issued currency. To liquidate Gaia cash would require using it to buy an item that would then be flipped for Gaia gold or used as barter.

**Cooperation vs. competition in the breedable pets shops.** The business community in this section of *Gaia Online*'s user-created art shops is generally marked by cooperation and a willingness to teach and assist other business owners. The line art that the case study shop's pets were built upon was purchased from a friend of the owner who also was one of the people that the owner (Nyght) asked for help and feedback. This friend also ran her own shop in the same section of *Gaia Online*. In fact, she ran a canine shop, which would have been a direct competitor to Nyght's first shop, selling breedable, growing canines. Established business owners were, in the participant's experience, very supportive even of potential competitors: "Breedables community is very supportive of new artists. ... Not jealous, at least in the shops that I would hang out in. They don't have a negative atmosphere" (Nyght, interview, March 2, 2010).

Nyght postulated that the openness to new shops was based on the overall desire of the community to expand the pool of talented artists and increase opportunities to purchase art created by others. “Everyone wants there to be more beautiful art there. You want people to succeed so that there is more art to buy. The big shops are not scared to lose their customer base. There is no lack of customers and people can be big customers in multiple shops” (Nyght, interview, March 2, 2010).

Because of their general level of openness, the breedable pets shops tended to foster learning opportunities for new artists and new business owners. Nyght reported that she could “just ask people on the forums [for feedback]. They are pretty helpful. The whole community thing” (Nyght, interview, February 7, 2009). When she ran into difficulties or needed advice about how to manage her shop and improve her art, she reported, “I would post questions in these other shops and ask people for help” (Nyght, interview, March 2, 2010).

And yet, there is a sense of shops competing with one another as well. This was especially a concern of small or new shop owners who struggled to attract the attention of new customers in a segment of the virtual world that is dominated by a few large shops. Nyght pointed out that new shops, especially those that wanted to develop a role-playing community “can’t compete with a larger shop” (Nyght, interview, March 2, 2010) unless they have something unique to offer. Even if the new shop’s art is better, the existing ones will be more attractive because of the large and active community around them that allows new customers to have someone to role-play with and talk to immediately. Nyght was particularly gratified when a customer chose to buy her art with his limited funds

rather than spend them at one of her big, very popular competitors: “I feel so complemented [sic] that my customs [customized pets] are competing with [shop name redacted]” (Nyght, post, November 21, 2008).

While Nyght frequently praised the breedable pets section as friendly and open, some groups were so large that it was difficult, even if you owned a pet in the shop, to get involved. Talking about another shop, whose art she admired and had purchased, “I don’t have any friends over there, and the community is impossible to get into ... I just prefer to hang out here” (Nyght, post, June 21, 2009). The breedable pets shop section of *Gaia Online* was a generally welcoming section much like a neighborhood of shops that keep an eye out for and help one another while also gently competing for business and working to survive.

**The business owner.** During the research period, the focus of this case study was a young woman between 15 and 20 years of age, referred to in this case study by her chosen pseudonym “Nyght”. She was in a private high school and entered a private college after graduation. She resides in a state without a requirement for financial literacy instruction in high school, but she took an economics course in college during the period of the case study. She had enrolled in a marketing course through a local community college during high school but dropped the course because she did not find it interesting. Her initial major in college was biology, an interest that had been evident in the choice of creating a business in the breedable pets forum.

It is important to acknowledge that her background was a key factor in her success as a business owner in a virtual environment. She is from an upper-middle class

family, and both her parents have graduate degrees. During the period of the case study, her father owned his own business and probably served as an example for her own efforts as a virtual business owner as well as introducing her to many of the economic and financial literacy concepts and understandings described in this study.

Because of her background, she is an ideal informant who was in a strong position to recognize and leverage aspects of a virtual economy to create her own business. Her background also put her in an ideal position with a strong foundation from which she could profit from learning experiences, increasing her own fluency with financial and economic concepts and skills through practice in a virtual world.

Nyght also matured during the case study and attended two years of college. Both of these factors correlate with increasing levels of financial literacy. This study may shed light on some of the previously unknown mechanisms responsible for this correlation found in the literature.

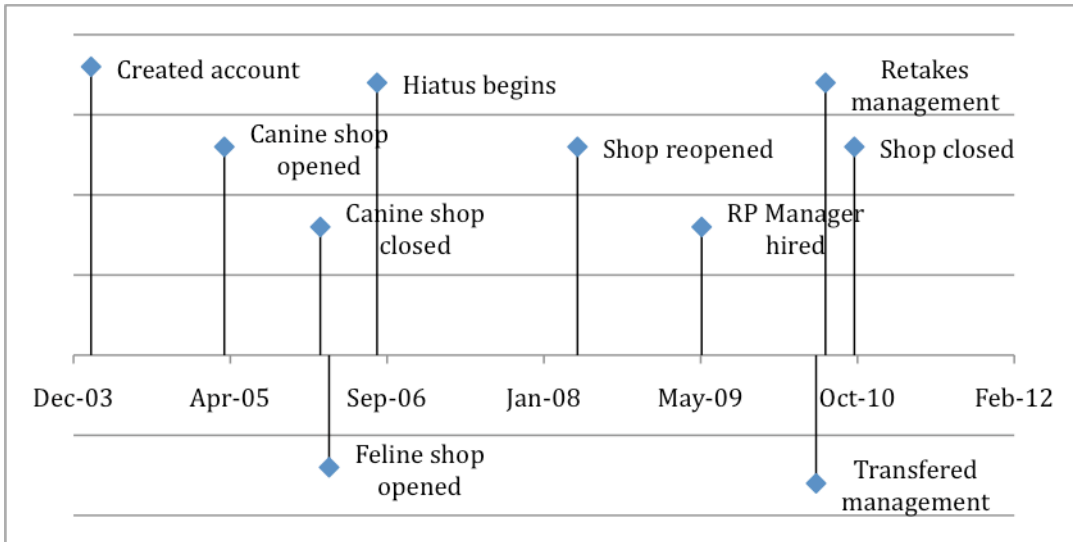
Nyght owned two businesses in this section of *Gaia Online*. She teamed up with a partner to create their first shop. The first was a partnership that produced canine pets. She partnered with an older person, who was in college at the time the shop existed (2005-2006). After about a year, they went their separate ways, and Nyght thought she was ready to run her own solo venture. The second started out with her as the sole owner and worker in a shop that produced felines. Eventually, the second business grew to include a total staff of seven people.

She decided to create these businesses partially because she enjoyed collecting pets and role-playing but also because she wanted the status and prestige of running her

**Table 8: Timeline of Participant's Business Activities in *Gaia Online***

<b>Month</b>	<b>Major Business Status Changes</b>
February 2004	Nyght created account in <i>Gaia Online</i>
April 2005	Canine shop opened (partnership)
February 2006	Canine shop closed
March 2006	Feline shop opens (solo)
August 2006	Beginning of long hiatus
May 2008	Shop reopened
June 2010	Management transferred to two former customers
July 2010	Nyght resumed general management of the shop
October 2010	Shop closed after decrease in activity

own business in these forums. She had been a Pokémon collector and played *Neopets* online before she joined *Gaia Online*. In Gaia, she became acquainted with the breedable pets forums and was a participant in some of the shops before deciding that she wanted a more central role in one. During her first year in Gaia, she had amassed enough money through careful purchasing and sale of monthly collectable items to partner in purchasing their first set of line art.



**Figure 12: Timeline of Participant's Business Activities**

**The businesses.** The shop is a text and art-based world all its own, created through its own story line, a map of that world, and the pets themselves. It is constantly evolving through the creativity of the shop owner and participation of the customer community. The shop is really a setting for collaborative creativity. On the surface, it would seem that the owner is just selling user-created digital art. However, with that art comes the opportunity to be part of a community that is jointly writing a story. While community members could participate in the story-writing by writing from an outsider's perspective, "playing small forest animals" (Nyght, interview, March 2, 2010), most people prefer to get a pet and become a more central member of the community, able to collaborate and develop plots with other community members. While it is not entirely non-hierarchical, the roles of owner and customer meet in the middle, and both are responsible for creating the shared story and increasing the visibility of the business within its forum environment.

The owner provides the space, the artwork, and framework of the story. The community exists as asynchronous posts between members. These posts occur in a set of discussion forums organized together in a collection known as a guild.

In the gaming world, a guild is a self-organizing group of players who band together to pool resources and expertise in order to achieve game objectives. For massively multiplayer online games (MMOGs), this usually involves group work in order to defeat extraordinarily difficult programmed opponents. But, for many complex games, the teleological event is merely the final point on a long group journey that involves training new players to play their roles well, making sure that they are properly equipped,



making sure that they know how to play together and fail with grace, and that they have developed group cohesion through informal social interaction. A guild serves as a community of practice and learning, a place to socialize, and sometimes is part of identity development and validation (Dalgarno & Lee, 2010).

In *Gaia Online*, guilds exist for similar purposes but also differ. Since *Gaia Online* did not initially have a game component, guilds are primarily used to collect people into communities of interest and organize their collective web presence. Most guilds in *Gaia Online* have a front page, used to introduce the guild to outsiders and potential community members. This front page displays the guild's banner (a graphic used as an organizational logo), lists requirements for membership, and provides an application (usually a web form). In addition to the front page, guilds also have a collection of discussion forums, conveniently grouped together so that guild members can see all their associated conversations. Since guilds cost gold to acquire, and are in limited supply, a group or business needs to commit resources to staking out their location in the virtual world.

For a role-playing shop, ownership of a guild is essential, since it allows for grouping and organization of the various discussion forums used for collaborative writing, informal socializing, and business activities. Nyght conceptualized the various parts of the digital shop as relating to parts of a physical store: "The main thread is like the front of the store and the inner front part of the store, and the guild is the D&D games that go on in the basement. The thread is the front of the store. New people come and they see the pets, they get the information they want, can make purchases in the thread.

People can post and hang out there. But once people get more involved and want to make formal role-playing that is separate from random thread role-playing. That's what the guild is for." (Nyght, interview, February 7, 2009).

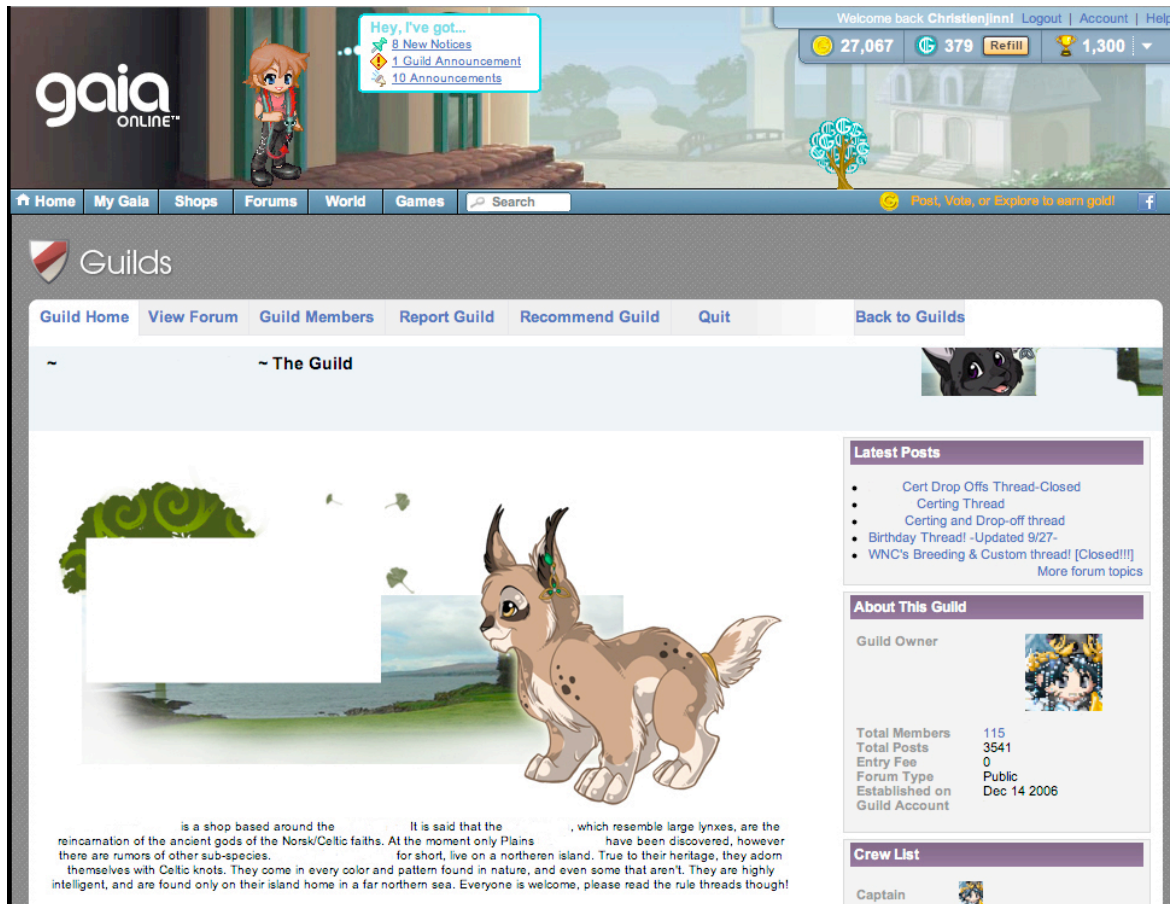


Figure 13: Image of the Business's Guild Front Page

In addition to the virtual world location, Nyght as the business owner sells the collectable artwork, which forms the basis of the interactions of the shop's customer community. In these breedable pets shops, customers purchase one or more pets, which additionally gives them the opportunity to role-play that pet within the shop's forums.

During the case study period, Nyght owned two of these shops. One was a partnership that sold canines; the second was a shop that sold images of lynxes with a

Celtic theme. She settled on the feline art for two reasons. The first was that a shop based on the Disney film *The Lion King* was very popular. She wanted to create a shop that could have a similar draw but also have its own concept and niche within the breedable pets forums. She wanted something that could fit into a northern climate with a Celtic theme in order to fit her own interests and taste. As she describes the thought process: “I thought - what is a big cat that has the same appeal as lions do that would fit into that? Lynxes. Lynxes are great. They are cute. They are big cats. They have that same exotic kind of appeal. And I can make it a Celtic themed thing” (Nyght, interview, February 7, 2009).

Role-playing a pet in the breedable forums consists of writing collaborative stories, each author taking turns in writing a section of the story from his or her pet’s perspective. Each author is expected to respond to what other pets are doing, noticing, emoting, and saying as their pet acts and responds to other characters and the world around them. The shop exists around an assumption that there will be ongoing interaction of residents who will play their pet characters for a period of time. Pets come in two complete stages - youth and adult - and residents assume that their pets will grow up and develop personalities as they appear in the collaborative stories created in the role-playing section of the shop.

Nyght considered the story an important part of the success of this type of business. She described the draw of her shop this way: “So it is both that people want the art and are interested in the story and they want to know how it ends. Then people get to be part of the story when they **have** the pets. For a lot of stores, mine included, what

happens when people RP [role-play] becomes part of the story. So they get to write it with me” (Nyght, interview, February 7, 2009).

To illustrate, the following is an example post in the role-playing forum. Nyght wrote this story segment from the viewpoint of two of her pets, a mother and cub. Since she owns both Senka and Shadowfoot, she is able to role-play both of them in a single post; generally, a resident only writes the point of view of a single pet. Notice that at the end of the post, she leaves an opening for another player to join in and continue the story of this encounter:

Senka had realized while she was on scouting duty the other day that it was actually quite pleasant to walk the borders of her territory, and why should her mate have all the fun? Thinking that it might as well become another duty of the clan leader to walk the borders once in a while for the scouting group, Senka had decided that today's lessons would include scouting. When she had proposed this to her daughter Shadowfoot, the cub's eyes had gone wide. Usually lessons consisted of time in the den or nearby, so the idea of spending an entire day tramping around the outer territory was quite appealing to the cub, and for the elder as well. It got boring staying by the clan den, and while it was safer, it didn't seem all that dangerous to walk the borders either. There hadn't been any injuries due to rogue encounters since the time that Senka had taken the thrown [sic], which had admittedly been many many seasons ago. Either the rogues had grown tamer, or there had never been all that much danger and her mother had simply been overly paranoid.

Catching the scent of a stranger, Senka looked down to her daughter who was at her side, “Shadow, do you smell that?”

Sniffing the air with a pointedly scrunched up nose, the cub nodded and then shook her head at the strange scent, “Yup! Tressapers [sic] mom!”

Laughing a bit, the adult nodded, and then thought of how to best handle the situation. She didn't want her daughter in danger, but it was important for her to learn how to handle outsiders as well, since she would be doing a lot of that as clan leader eventually. Spotting the very dark form a few lengths off, Senka looked to her daughter, “Stay a safe distance behind me so that you can run if things turn bad.” Though Shadow tried to protest, the elder continued over her daughter's words, “But stay within hearing distance so that you can learn how to handle trespassers. We don't ever want to be overly hostile, so I will approach her confidently but kindly and offer her assistance.” Shadow nodded, taking mental notes as always.

Senka turned and started towards the female, furrowing her brow slightly as the dark female's pelt came into view. From the looks of her, she could certainly have been descended from the Shadowhill clan, which made Senka even more interested in what the intruder was doing on their territory. As she came within speaking distance, the clan leader called out, “Hello there. May I assist you?” (Nyght, post, July 24, 2009)

The owner provides an outline or a framework for the customers to participate, such as an incomplete map and description of the world, the basic design of the pets (as

black and white outlines), rules of how and where the pets can interact, breeding and coloring parameters, and story beginnings. She also provides activity in the form of time-sensitive events. Customers collaboratively create stories in the given framework, and they influence the art by purchasing custom pets and choosing which pairs to breed, creating an evolving family tree.

In shops that have existed for many years, these family trees and family histories become complex and rich. Pet owners usually keep track of the family trees of the character pets they own, as well as the evolving family history, in a section of the discussion forum. There is pride and prestige associated with having pets that have participated in long-running stories and have been desired partners for story telling and creation of subsequent generations of digital pets. This indicates not only an eye for attractive art but also successful partnership in story telling.

Nyght has actually been an owner of two virtual businesses in *Gaia Online*. Both were quite similar and were located in the breedable pets forum section of the virtual world. Both businesses operated in similar fashion - selling virtual, user-created pets that customers could role-play in a collaborative, story-based world.

Creating a business in *Gaia Online*'s forums involves finding and organizing the guild's discussion forums and front page. Much of the initial work is creative. The artwork needs to be created, and a storyline for the role-playing needs to be set out. But these can be in done in rough outline and even left incomplete, to be fleshed out over time by contributions of the customers, gradual revelations by the owner, and events, such as festivals and competitions. As Nyght describes it: "There are these little lynxes.

I've created the story where they live on an island in the Atlantic somewhere that is completely surrounded by mist. The mist is somehow magical, but that hasn't been revealed yet. So it actually kinda a teaser story that as people RP [role-play] more, I'll reveal the story of this place" (Nyght, interview, February 7, 2009).

The artwork begins as black and white outlines, called "line art". Part of the skilled artist's work is to take the flat outline and create a shaded, three-dimensional version that is more of a finished product, called a "template". Usually, the pets are all based on a few templates. These templates show the pets at various ages (baby, youth, adult) and in two genders. Individual pets are created from these templates by choosing coloration, patterns in the fur, jewelry and other augmentation, naming, and creating a back-story for them. If a pet is created from a breeding episode, its parentage is also part of its history and identity. In some cases, long-running shops have large and complex family trees.

Owners of shops such as this often set rules for coloration of their pets, and the owners and colorists usually create pets to suit their artistic vision and skills. However, at times, shop owners will open up periods during which customers can buy pets with an opportunity to have the artist customize the pet to greater or lesser degree. Customization can range from simple color choices to complex edits on all stages of a growing pet, with cost adjusting correspondingly. In this way, the customers can and do influence the creative expression of the shop, but they must invest in the shop in order to do so.

In some shops, attempts are made to devise rules for how offspring will inherit attributes (generally coloration) from parents, and this may be controlled, in part, by probability.

After creation of the shop and the artwork, the lion's share of the business owner's work is to be present in the shop and interact with customers. This is an important part of advertising the shop, since the shops are listed in the forums by the most recent activity. Frequent postings, therefore, mean that the shop is near the top of the list and most visible to new visitors and potential customers. When school was not in session, Nyght would be online and keeping an eye on the shop forums "pretty much all day" (Nyght, interview, March 2, 2010). This was particularly true when preparing for large events and finishing up after them. Since the pets have multiple stages as they grow up, the artists must be able and willing to match coloration of one purchased stage throughout the lifetime of the pet, which means coloring three images: newborn (never sold alone), youth, and adult stages. During school terms, the owner's time commitment dropped off to occasional 10 - 15 minute check-ins during the day with occasional bouts of a few hours every couple of weeks.

Nyght had decided to make her shop very open and welcoming. Anyone with a *Gaia Online* account can join the guild in order to look around and hopefully get hooked by the pretty pets, the quality of the writing, and the friendliness of the guild members. Naturally, activity is also an important part of making the shop successful and satisfying for the existing customers as well. Part of the draw of these shops is the social interaction between members of the community. This interaction can range from casual chitchat



between community members or the more seriously creative interactions that take place in the in-character role-playing sections of the shop.

*Staff.* At the height of the shop's popularity, Nyght had seven staff members. According to Nyght, this is not unusual. "Many shops have more than one colorist or have guest colorists" (Nyght, interview, February 7, 2009). The majority of her staff members were contract colorists who worked on commission under her direction, but she also had a variety of people who managed the daily tasks of the shop as well. Colorists were paid on commission for pets that they colored. Nyght considered them working for her since she retained the ownership rights to the art and concept and directed the work to be done. She paid them on commission (usually 80 to 90% of the sale price) after one of the pieces they had colored was sold and delivered to the customer.

Nyght hired new colorists periodically by posting an announcement and requesting samples of their work. Generally, she had a good response and was able to find colorists who shared her aesthetic. She also often selected colorists from the community because she knew that they were already committed to the shop and understood her vision for it.

Staff members were paid in product if their function was not tied to production, such as the people who managed events (Event Manager) or who were hired to interact and monitor the shop's forum activity (Thread Manager). At times, the shop owner also employed a person to keep track of who owned which pets and to foster role-play between characters (Role Play Manager). She also sometimes had a Certist, who created the digital certificates that indicated a pet's name, gender, and owner. Finally, in 2010,

Nyght experimented with hiring general managers who were responsible for the overall functioning of the shop and coordinating the work of the other staff members. These staff members were usually offered a semi-customized pet in exchange for the time they spent managing their aspect of the shop. In some cases, a staff title was more of an acknowledgement of a person playing a key, volunteer role in the shop community rather than an employment or contract relationship. It symbolized their status as long-standing, committed members of the community and marked them as part of the shop's inner circle.

Nyght and her staff members ran the business casually, but they showed some indications of practice that approximated professional levels of business practice. The staff had a private forum that they used for staff meetings. Some shops use real time chat to hold their meetings, but since some of the staff members of this shop were from other countries, they preferred to use the asynchronous forum discussions to allow time for translation and understanding. Private messaging, which is also asynchronous, was also a useful means of communication. Additionally, although Nyght did not point this out, using the forum discussions for staff meetings had an additional advantage. The discussion posts are permanent; so staff members can review what was decided in order to check their understanding and remind themselves of group decisions.

*Customers.* Although real life identities are not known, Nyght estimates that her customers are high school to college-aged or older and are predominately female. They seem to be above the average age of most Gaias. Her regular customers are certainly not the average resident. While Nyght does price her pets below the average for the

breedables forums, they still cost more than the average Gaian can afford. The community grew up over time, although Nyght points out that they really did have fun in a child-like manner, playing with “these cartoon images that can talk” (Nyght, interview, March 2, 2010).

She had four to ten regular customers who also participated in the role-play story creation in addition to purchasing several pets. This number varied during the case study, often falling off during the winter and picking back up during summers. Nyght commented in February 2009 that she had one customer who posted “all the time and who I chat with and keep the thread active with” (Nyght, interview, February 7, 2009).

At the height of popularity, the shop attracted approximately 100 casual customers. This number varied significantly as well. In February 2009, Nyght said that they had about 50 people interacting in the forums. These people might interact with each other and bid on pets occasionally. Hence, the draw of the shop obviously goes beyond the desire to role-play and collaborate in the official narrative story. There is a strong element of hanging out, social networking and community. Visitors seem to seek their own level of participation.

Shop owners will periodically create a poll in the main discussion forum, asking casual visitors to click on a button to indicate that they were there. Since taking polls is one of the ways that people earn gold in *Gaia Online*, they have an incentive to click and be counted.

***Role-playing.*** The interest in role-play also seems to have varied a great deal during the case study period. It was part of the purpose of the guild, and in fact one of

the major motivations Nyght cited for starting the shop. In 2008, role-playing through creation of the collaborative stories, and casual interactions in the main guild accounted for the majority of posts. In January 2009, the researcher noted that role-play seemed to be declining. By July 2010, Nyght's regular customers - by her description - did not role-play much, but they had a lot of Gaia gold and liked to collect Nyght's art. The success of the shop began to be discussed more in terms of how much custom and breedable business Nyght was getting and less in the collaborative writing that had been her main reason for running the shop.

Some of the variation may be due to seasonal variations, although Nyght noted in the summer of 2010 that it was unusually quiet in her shop. She worried that the friction with her former managers might have caused the shop to be the victim of bad press, causing a drop in interest in role-play and in difficulty attracting new colorists to take up the load.

### **Research Questions**

This study focused on exploring how the development of a business in a virtual world facilitates the development of financial literacy among teen and young adult business owners.

Sub-questions that helped frame the inquiry were:

- What does it mean to be financially literate in *Gaia Online*?
- How does financial literacy in Gaia Online relate to other definitions of financial literacy?

- What business challenges trigger learning episodes in the virtual world?
- What concepts do virtual business owners use to frame their business activities and decisions?
- How do virtual business owners reflect upon and learn from their virtual world experience?
- How does experience in a virtual economy influence their confidence in managing personal finances?
- How does experience in a virtual economy influence their development of identity as a financially literate person?

**What is financial literacy in *Gaia Online*?** These are concepts that are helpful to understand, especially as a business owner, although anyone who participates in collecting, buying, and selling items in the world needs to understand some of them.

***Setting goals.*** In *Gaia Online*, financial literacy first involves decisions that the resident makes regarding what he or she wishes to do in the world. The researcher noted during her own activities in this world that, unlike in many computer games, both single and multiplayer, residents of *Gaia Online* have no externally preset goals nor designed paths of progression toward fixed outcomes set by game designers. When a person creates an account in this virtual world, he or she is free to decide what to do, how to pursue particular interests, and what to count as successful completion or achievement. In this way, *Gaia Online* is more like the more famous virtual world, *Second Life*, than a multiplayer online game such as *World of Warcraft*.

In interviews with the case study participant, Nyght identified her goals for the business as personal and intrinsic, rejecting the obvious potential measure of success as amassing large amounts of Gaia gold. Instead, she pursued her own goal of creating a sustainable business that could support active and ongoing role-playing and story-telling activities (Nyght, interview, March 2, 2010).

***Earning money.*** Financial literacy also encompasses the ability to find effective ways to earn money and interpret financial information to make satisfactory purchasing decisions. Residents can make money slowly by a variety of routine activities such as posting in forums, voting in polls, and viewing advertising. When they get serious about earning money, however, then they begin to seek out and discuss more efficient means of earning gold with less time investment. The researcher occasionally observed episodes in which shop customers discussed and compared options such as playing games or fishing. Nyght's preferred method was investing in the monthly collectable and evolving items that she then held and sold when they were reaching a certain threshold of value, a strategy that will be presented in detail in the discussion on investment. Gaia's developers have pages where they list the various ways that users can earn either Gaia gold or Gaia cash, but they don't rank them in order of efficiency. Users must evaluate various strategies and choose the best fit for their goals and chosen play style.

***Investing in limited edition items.*** There is value in investing in items and holding them until they become increasingly valuable. Nyght had items that she purchased five years prior that had become “super valuable” (Nyght, interview, March 2, 2010) because it had become rare, increasing its value over time. There is a value to

information and keeping up with the market value of items. Tektek.org is a sophisticated publisher of market trends for collectable game items in *Gaia Online*.

In order to purchase items, users have some options and can consult market trend information to decide what to buy and when. They may have a choice between buying an item from a shop vs. buying it from another user and need to know how to check both the shop and the Marketplace for the lowest price, although if a user consults the market trend information, that is now readily available in the display. Users can also look at historical trends over the past month or year to see how pricing and sales volume has fluctuated before they decide if they should invest in an item or not. Once a decision has been made to purchase an item, they can then decide if they want to buy it right way (buy now option or purchase in an automated shop) or bid low in an auction. Each choice has its advantages and disadvantages. Feedback is fairly quick. Although the case study ran over five years, most transactions are completed within a day, and the longest most have to wait even for an auction is two weeks. If a user buys an item as an investment, it might need to be held for an unknown amount of time to increase in value. Some items are poor investments, and a user will learn this by interpreting the market information, seeing that the item sale price continues to trend down or does not sell at all.

***Intellectual property.*** At least in the breedable pets section, there is a nuanced understanding of intellectual property. While intellectual property experts may not recognize the terms or differentiation of ownership and rights that residents use, the regulars in the breedable pets forums definitely understand that purchase of the art actually provides certain, limited rights: to role-play the character associated with the

artwork they have purchased, to display it within *Gaia Online*, and to request that it be mated to another pet to breed a litter of cubs (ownership to be split by agreement between the owners of the two adult characters, if applicable). But they also understand that the line art (aka the template - which is the black and white, non-variable part of the series of pets) may have been originally drawn by someone else and is licensed by the shop owner as a basis for her art - and that their ownership rights depend upon the agreement by those two parties. The line artist is sometimes also acknowledged by having his or her signature on all pets created from the black and white template originally provided to the shop owner. The community works to prevent people from claiming the art as their own work or displaying it outside of Gaia (although they admit that this is hard to enforce outside their section of *Gaia Online*). They understand that they are not allowed to create their own art by using the template to create their own colorings, unless permitted by the shop owner, and they cannot modify their pets without the agreement by the shop owner. When the shop closed, one of the major concerns of the customers was that shop owners in the future might decide to take back their property and “rehome” the pets.

Pet ownership is carefully tracked at the shop where it was created and sold. The owner is listed with all of his or her pets on an ownership page, and the seller of the art also creates and provides the buyer with a certificate of ownership, which includes the owner, the pet’s name, and any details about parentage and personality, if applicable. In part, this is to enhance the prestige of the shop, since long running breedable pet shops have substantial family trees. The practice, however, is thought to discourage people from stealing or imitating others’ work too closely.



*How to handle employees and contractors and delegate effectively.* Nyght's staff ranged from none to seven people, depending upon how popular the shop was at various times. This gave her quite a lot of experience in the virtual world that parallels running a business or managing a portion of one. One thing she had to learn was what to pay contractors and how to manage the deal fairly while minimizing risk. She eventually settled on paying contractors 80% of the sale price on a basic, colored pet, but she boosted the contractor's take to 90% if the pet required customization because of the situation of the sale (a custom pet, an auction, or a raffle). She shows an appreciation for the work that the colorist does while also recognizing that she as the shop owner has put in some effort that deserves compensation - creating the certificate for the pet and organizing the sale and space.

*Reputation and social capital earned over time in the unique art market are important.* Nyght had established a reputation for her art and for the shop, which she evaluated based on the number of people who would bid for her customized items when she announced a sale and also by the number of people who wanted to color for her whenever she posted a help wanted notice. However, this reputation can be sullied. After Nyght had attempted unsuccessfully to appoint managers for the shop, and the resulting fall out when that attempt failed, the shop seemed to have lost its standing. Nyght could no longer attract colorists or other staff to work in the shop, and she worried that the interim managers "actually did black ball me" (Nyght, interview, July 31, 2010). Since Nyght did not have time to devote to the shop in the fall, she decided to let the shop close rather than try to regain her reputation in the community.

*Selling/licensing of unique, user-created art in a parallel market.* These user or buyer communities are the sort of thing that many brands are trying to form around their products online via company websites, in virtual worlds such as *Second Life*, and even possibly in *Gaia Online* – note the branded items that have found their way into *Gaia Online*. The purchase of a pet allows an owner to become part of a creative community that is creating collaborative fiction --- or text-based role-playing. Games and participation in the forums or in story creation also moves a resident further into the inner community. More inner community members may commission unique art or semi-custom artwork within parameters. They can also become real insiders and take official roles in running the business and/or community.

Business owners must choose what to sell based on market interest and the residents' own preferences or skills – both in the official Marketplace of Gaia created merchandise as well as the user-created markets in the guilds. Successful businesses locate the correct main forum and find a niche for themselves that is just popular enough to get customers but unique enough that they have something to offer. “So, you need to have a unique idea. I see so many horse shops and cat shops. And since *this Lion King* shop has done well, there are so many knock-offs of that. Recently, I saw a shop based on Gargoyles, the TV show. That’s a great idea! There isn’t a successful shop based on that; people love that TV show. So you need to find something where there isn’t a shop that has occupied that niche” (Nyght, interview, February 7, 2009). In order to gain a position for herself in the breedable pets shops, she researched various Photoshop techniques, eventually deciding to set her shop apart by the type of shading used to give

their pets an artistic dimensionality. Since it was a relatively unusual technique in Gaia, it had an artistic appeal and made their shop stand out from the competition.

*How to negotiate.* When she and her first business partner decided to set up shop, they showed remarkable sophistication. “I realized I had enough capital to buy a set of lines and so I wanted to. So, I had been looking for a set of lines and came across this set for the canine shop. Nice set of lines and very well done. So, I bid for them. Actually co-won with another person. We combined our bids so that we could bid higher together on the bidding ladder. Bidding ladders allow you to get more pieces of line art for a very high bid. You get more pieces and stages with a high winning bid. Good for the artist too, since that tends to make the bids go higher if there is a greater incentive” (Nyght, interview, February 7, 2009). They worked together to co-own a much larger set of drawings than either of them could have afforded separately.

Nyght tried to negotiate a rather complex agreement when she turned the shop management over to two former customers, and it may not have been sufficiently clear to all how this would work. Nyght kept ownership of the concept and of the line art (which she had purchased from a line artist at the beginning of the business), but the other two assumed responsibility for daily management while Nyght continued to work as a colorist. In analyzing the discussion posts and interview data about this period in the shop’s history, the researcher observed that the business owner and the managers seemed to have a different understanding of how the roles and responsibilities were allotted as part of the management agreement. The managers seemed to think that they had become the new owners of the shop. Nyght, however, thought that she had only assigned them

responsibility for general management of the store and its staff members, keeping control over quality of the product and ownership of the art and the shop itself.

During this period, the line art licensing agreement became a problem, since the new managers were not comfortable offering a product that was built on art that they did not own. This situation was further complicated when the original artist changed her licensing agreements and renegotiated with her clients. The line artist that had drawn the base for Nyght's pets changed her licensing rules, but negotiated with Nyght to allow her to continue operating her shop under the old agreement, grandfathering their license and allowing the shop to run as it had before.

As these two, separately negotiated agreements intersected, it became clear that this playful, virtual world could be a challenging environment in which to practice business management, and that what seems to be a simple situation in a multi-user environment can be as difficult to untangle as any business agreement in the real world. This became a significant business challenge as Nyght, the line artist, and the managers all worked to understand how the changing agreements affected each party differently, where responsibilities and rights lay, and how the shop would operate in the future. The confusion of the managers, who were concerned that they would be responsible for a violation of the licensing agreement, ultimately led to the closing of the shop, pointing out how important the ability to negotiate effectively is to maintaining a successful business in this virtual world.

**How does financial literacy in *Gaia Online* relate to other definitions of financial literacy?** Financial literacy in *Gaia Online* shares many subject domains and

types of understanding with those included in traditional definitions of financial literacy. In order to explore this question in depth, the financial literacy framework from Chapter Two is employed as a guide to exploration of how financial literacy is evidenced in this case study as well as what topics are potentially raised in the breedable pets shops.

**Concepts.** Similar to the factual knowledge level of Bloom's revised taxonomy (Krathwohl, 2002), the conceptual level of financial literacy knowledge provides an essential base of ideas that can be expressed in words and is often assessed using written explanations and multiple choice tests. This section will show how the world introduces concepts, fellow Gaians introduce and explain concepts, and the research subject can explain financial literacy concepts.

While *Gaia Online* is not designed to be an educational virtual world, its developers do provide occasional guidance to users in how to earn income and otherwise function successfully in their economy. *Gaia Online* provides a handy list of ways to earn their virtual currency, Gaia gold, which includes the sale of user-created art in its 16 suggested activities. The developers also include observations of financial or economic concepts in context on various pages on the site. For instance, in relation to the limited edition items, developers connected the potential of rarer items to go up in value: "Since they're sold for a limited time only, Monthly Collectibles have the potential to shoot up in value" (Gaia Interactive Inc., 2012).

As a type of understanding, concepts are sometimes introduced in *Gaia Online* through direct instruction from residents while aiding one another to perform business related tasks. For instance, one group of residents maintained an item price guide in 2005,

which customers of the case study shop used as a reputable source for fixing the value of items offered in trade. The guide creators used their front page to remind residents that prices would only increase dramatically if people were willing to buy at those prices, counseling users to remember that the developers “have no control over the economy’s prices, only you do ... An item is only worth what a buyer is willing to pay for it” (resident, post, June 14, 2005). This is an important concept in the virtual world, where prices are extremely fluid, and was offered in the context of negotiating the exchange of goods.

When evidenced in *Gaia Online*, concepts are often explained to residents at the point where they will be used to make a decision. In the case of item valuation, both the developers and residents introduce the concept as preparation for a decision that the reader may be contemplating, such as purchasing a monthly collectable or in using the price guide to make a trade decision. Nyght also evidenced this level of understanding when explaining her understanding of finances in the virtual world. She noted that that the price of an item was “what people are willing to pay for it” and that the “marketplace sets the price” (Nyght, interview, February 7, 2009) when asked how she decides how to price her items for sale in the user-created auction. She based her decisions and actions upon concepts that she was able to articulate.

Nyght’s understanding of complex financial systems and the virtual economy was something that she was also able to express in her interviews, showing that she had an explanatory understanding of a variety of concepts. She recognized ways that *Gaia Online* controlled its money supply and inflation, sometimes by changing the way the

Marketplace operated. She also understood that the behavior of users affected the actions of others in the Marketplace. For instance, when she and her partner in the first business combined their bids so that they could bid “higher on the bidding ladder” that would be good for the artist as well as for them since “that tends to make the bids go higher if there is a greater incentive” (Nyght, interview, February 7, 2009).

***Application.*** Application in financial literacy education generally applies to the ability to apply economic and finance concepts to making decisions, evaluating options, and making choices. The application level of understanding also involves reading and understanding financial information. Information and language usage are part of applying financial literacy concepts in a social context.

Much of the activity in *Gaia Online* relates to buying and selling items and user-created art. Residents make many purchasing decisions, and some of them recruit their ability to read financial reports, such as Figure 10 above, in order to evaluate purchases that may or may not be good investments. Nyght particularly used the market activity reports to guide her purchase or sale of items in order to maximize her net worth. She was able to decode the graphs and information to determine if something was likely to go up or down in value. For instance, in November 2008, she noted that some of the items in her inventory were starting to lose value, and that it was a good time to sell them so that she could purchase something expensive she had wanted to repurchase. “I sold a few items that I thought were declining in price and not a good investment any more and saved up profits from this even and was able to scrap [sic] together enough gold to by [sic] my slippers back!” (Nyght, post, November 03, 2008). The slippers that she

purchased were a high-value item that has tended to retain its value over time, and is one of her avatar's signature clothing items.

She also had developed strategies that she used and recommended to buy items and accumulate value over time. Monthly collectables, being limited edition items were generally considered a "sound investment" (Nyght, post, October 15, 2008), provided that they were items that she also considered artistically appealing so that they would be in demand as well as limited in supply. She had experience with some limited edition items that had not been good investments. "Not everything is wanted even though there are few of them. Some things are not valuable because people don't want them. Like a monkey hat ... who wants a monkey hat? It has to be pretty and complement people's avatars so that people want it as well as being rare" (Nyght, interview, March 2, 2010). If the item seemed appealing, she would purchase it and keep an eye on its market price "until the item is worth a couple hundred thousand [gold]. Then I figure I might as well sell it" (Nyght, interview, March 2, 2010).

Nyght made many purchasing decisions in the course of running her business, applying both basic and sophisticated concepts. She used basic concepts such as looking for a location for her shop at less than the usual asking price that *Gaia Online* developers used in selling guilds to groups. Shortly after she opened her solo, feline shop, she approached a retiring shop owner to ask if she could buy the existing guild space: "I'm interested in purchasing it btw [by the way], I like recycling and saving a few k [thousand gold] is always nice ..." (Nyght, post, May 11, 2006). She also applied her understanding of more complex ideas and strategies, however. When she started her first



business, she worked with another person to get a better deal in an auction. “We combined our bids so that we could bid higher together on the bidding ladder. Bidding ladders allow you to get more pieces of line art for a very high bid. You get more pieces and stages with a high winning bid” (Nyght, interview, February 7, 2009). Nyght was therefore, able to apply concepts she had learned in order to make decisions by evaluating options and choosing between alternate actions.

In addition, there are several data points where the participant or customers talk casually about the need to save up Gaia gold in order to make larger purchases. Both Nyght and her customers worked and delayed minor purchases in order to buy high-value items and invest in her business. This is also an application of financial literacy, which some games for young children aim to teach. They have to maintain discipline and watch their balances, purposefully not spending gold on things until they have saved up enough for the major purchase they want. Some residents even create separate accounts to aid them in this task since there is no other way to hide money from themselves. Note that this mirrors a real life practice of opening up accounts for special purchases such as education or retirement.

Finally, Nyght was able to use specialized terms in both the interviews and in the discussion forums. For instance, when customers wanted to be able to use multiple low-value items in a trade, she asked the customers, “could you liquidate them or would it take too much time?” (Nyght, post, February 7, 2006). Not only is she using specialized financial terms, but she also expects that her customers will understand these terms as well and be able to apply them to take appropriate action in how they manage their assets.

**Experience.** A great deal of learning in this case study seemed to take place through observation and experimentation. Financial learning in *Gaia Online* involves experience, especially with enacting financial decisions by the learners themselves. Nyght had many experiences with financial matters during her years in the virtual world economy. She invested in the limited edition monthly collectables early during her participation in *Gaia Online*, and learned from others how to evaluate their economic worth as collectable items.

She observed the breedable pets shops during the first year while she participated in their communities and purchased their pets. This experience inspired her to open her own shop in order to see if she could do it and garner the prestige she associated with the owners of the shops she liked. During this period, she learned the community's terminology and unique ways of managing businesses in the virtual world, such as running flaffles and valuing trade items using user-created price guides.

Nyght's early attempt to run a virtual pet business was not initially a strong success. As she observed in an interview, new shops struggle initially to attract attention and customers because they have to compete with well-established shops that have strong communities and a high volume of interactions and communications. She did go to other shops to see what they were doing so that she had some ideas of what worked. So, observations were used to gather experience that she reflected upon, made her own decisions about what to try, solicited feedback on some of her ideas, and then she implemented them.

Nyght next experienced running a business with an older, more experienced partner. Many of the features of the second shop mirror those of the first, although initially, the feline shop was less complex than the first. It offered fewer stages for each individual pet, it did not have breedings, it did not have familiars or items, and the pets did not have any special abilities. In later years, 2009 and 2010, many features of the first shop began to appear in the second. Also many of the interesting processes, such as flaffles, are things that Nyght experienced in other shops and decided to incorporate into hers in order to solve particular problems, such as dealing with people in different time zones and to attract more customers. She frequently mentions going to other shops to observe how they operate, how much they charge for their pets, how they manage guest colorists, and what events are successful.

She also mentions experiences that she has that caused her to reflect upon what happened and make decisions about how she ran her business. She chose to under price her pets, relative to other shops, because she experienced “how frustrating it is to try to save gold for really expensive customs” (Nyght, post, May 22, 2009). She also learned from past mistakes in this low-stakes environment. For instance, when a Fourth of July event flopped, she decided that the US-centric holidays would not draw enough business and decided not to run those in the future, sticking to more globally celebrated holidays.

***Identity.*** Closely tied to prior experience and learning of financial concepts is an individual’s perception of him or herself as a financially literate person. This aspect of financial literacy has also been called *perceived knowledge*, and it is a type of knowledge

that is often evaluated in surveys using self-reported measures of confidence or perception of the subject's ability to manage money and personal finances.

Nyght's self perception in regards to financial competence is a blend of two seemingly different self-perspectives. On one hand, she was confident enough to experiment with running a virtual business. After nearly a year of partnering with another person, she started her own solo venture almost immediately after closing down the partnership. She also experimented with a variety of ways to attract more customers and retain them, running different types of sales and events, experimenting with different variations and additions to her product line, and even venturing into selling custom work for real money. When faced with business challenges, such as low participation in the shop, she tended to express the belief that problems could be met: "Anyway, keep bumping [pushing the forum to the top of the list] and talking and we'll get this place back up in no time!" (Nyght, post, May 20, 2008).

On the other hand, Nyght was also willing to seek out help and mentors who could give instruction, advice, and feedback. Nyght was able to recognize many of her own limits when it came to running a business successfully. When she encountered various business challenges, she sought advice and feedback from people who had more experience in managing shops in the breedables forum. She also sought advice from her parents, especially her father who was employed in the financial services industry.

This attribute may actually be an important factor in developing financial literacy, the ability to recognize one's own limits in order to seek out more information or expert advice. One of the problems that concerns financial literacy experts is that many people

may not be able to recognize situations in which they are not prepared to make financial decisions or analyze complex financial information. Hence, Nyght's willingness to seek advice and feedback in running her business shows a balanced view of self as a financially literate businessperson who still had more to learn in order to succeed.

***Relationships with financial institutions.*** A great deal of personal financial activity is mediated through financial institutions, and financial literacy involves the ability to broker relationships with people or entities that help a person manage financial transactions or gain access to financial services. The types of simulated financial institutions vary greatly in online computer games and virtual worlds. In *Gaia Online*, while they exist, traditional financial institutions such as banks, have limited functionality. Banks exist only as a way to start a trade with another resident, and there is no mechanism for saving money, earning interest, or acquiring credit. Hence, *Gaia Online* residents have limited ability to develop or evidence their ability to establish relationships with the commonly available types of consumer financial institutions and services.

The lack of banks, in fact, had attracted comment from both Nyght and some of her customers who lamented the lack of a place to save money and earn interest. *Gaia Online* served as an example for them of the challenges of managing their money without access to a financial institution. While residents had developed workarounds, such as creating separate *Gaia Online* accounts (usually called "mules") for shop assets or as savings accounts, they recognized that this financial system lacked something that exists in the real world and also in some other virtual worlds, such as *Neopets*. They also

recognized, in making these comparisons, that banking accounts have different features that may be beneficial to the user, such as security and a way to earn income passively.

Analogs to other financial service institutions do exist in *Gaia Online*, and Nyght was able to establish a formal relationship to them and attain services through them. The most important of these was the official *Gaia Online* Marketplace, which serves as the mechanism to sell and trade items between the virtual world residents. The Marketplace requires that each resident who wants to sell or trade with others must purchase a trading pass for a one-time fee of 500 Gaia gold. While this is a modest fee, even for the generally-cash poor residents of this world, this small barrier to instigating a connection to the financial service mirrors the process to establish real world online trading accounts and to do online auctions, such as through e-Bay.

There is a growing amount of sophisticated financial information regarding the official *Gaia Online* items. Currently, this information is provided in a web-page format similar to stock market analysis reports and prospectuses. Nyght relied upon several of the entities that reported this information. These services initially included the user-created price list guides available in 2005 that were gradually replaced by more complex services that Nyght used in 2008 and beyond. The sophisticated online trending information and graphs were first introduced in the fan-created site *tektek.org* and then later became available in the official *Gaia Online* Marketplace. For digital natives, this may be the way that they will habitually interact with their financial institutions, except in the few situations that require an in-person visit to a bank or similar institution.

For Nyght, opening up real life commissions via PayPal was an indicator of real world financial confidence as well as her ability to negotiate relationships with real world financial institutions. She was also able to compare the relative effectiveness of different ways of managing online transactions because of her experience both with the *Gaia Online* Marketplace and Pay Pal. She actually found Pay Pal wanting as compared to *Gaia Online*. Pay Pal does not have a mechanism for starting a trade in order to escrow money committed to purchasing a custom pet, one feature that the custom shops relied upon heavily in order to conduct transactions with their customers.

**Behavior.** As indicated by the PACFL 2009 report's definition, desired financial behavior is ultimately one of the most strongly recognized aspects of financial literacy. A great many definitions express or imply that certain behaviors can be expected out of financially literate people, such as "paying bills on time, having manageable levels of credit, setting financial goals and having a way of achieving those goals through saving and investing, spending wisely, and so on" (Hogarth, 2006, p. 3).

Several of these identified behaviors are not strongly present in this case study because the virtual world's design does not encourage their development. Neither paying bills on time nor managing credit are core components of financially literate behaviors in *Gaia Online*. This world does not incorporate a time delay aspect to paying for purchases, nor does it incorporate routine, repetitive payments. In some of the virtual businesses, the potential exists for paying employees and contractors at set intervals, however Nyght avoided this situation by making sure that her colorists are paid immediately when a commission was completed or when a regular sales event concluded.

Staff members had access to the shop mule account and were able to withdraw their earnings, using the trade system to keep records of sales and earnings transfers.

Aside of paying her staff and colorists, Nyght did not have routine expenses. If she bought anything, the transaction was completed by the trading mechanisms of the virtual world. Even in cases where she might purchase a custom pet from another shop, which is an event marked by a time delay in making the purchase and actually paying the sales price, this is managed by depositing the price of the pet up front, which removes the gold from the buyer's account and holds it in escrow until the seller completes the transaction. As is further discussed in Chapter 5, given the uniqueness of this case, this is an area in which further research might reveal practices that recruited this ability.

Having manageable amounts of credit was also not a significant factor in financial literacy in this section of *Gaia Online's* user-created businesses. Nyght might have pending trades out if she were purchasing a large item, but the system managed that by subtracting the promised amount out of her account as soon as the trade is started. So, there was never a moment when she was obligated to pay an amount of gold that she did not have already in her account. She also did not owe her colorists or workers for work since the transactions were managed as commissions. Colorists were paid as soon as the shop was paid for an item. In fact, the colorists had access to the shop's mule account so that they could access it in order to pay themselves when a transaction was complete.

Also, since they are actually contractors and not employees, if they colored something that did not sell, they were not owed money.



Not only did Nyght avoid owing people money, she also worked to minimize the amount of money owed her by customers. She maintained a sales policy that required new pet owners pay the purchase price of the pet within 24 hours of a sales event. Although there is evidence that she may have allowed established customers some leeway in meeting that deadline, she refused to set up credit or gradual payment terms because she had poor experiences early in managing her business involving customers who did not “come through with their promises” (Nyght, post, February 5, 2006). When she agreed to create a customized pet, she would require the customer to pay for the pet upfront, using the Marketplace trading feature so that the customer committed the purchase money, rather than extending credit or risking that the customer would not pay for the work done. Hence, although other sections of *Gaia Online* may make use of the virtual world’s features to manage credit, this aspect of financial literacy was not strongly represented in the data.

Setting financial goals and achieving them through saving and investing was something that Nyght did. As evidenced in her posts in the shop, she set goals such as saving money for the guild space, and frequently mentioned that she was saving or queuing up for large items to buy personally. She also saved money to invest in line art for the shop and did so repeatedly. She did not measure her success in terms of income or net worth, however. In the hobbyist, participatory creative economy, success is often measured in terms of the size of the community around a shop, that people value your creative work, and that your peers respect you.

Spending wisely seems like something of a value judgment, but Nyght had clearly developed strategies for assessing a purchase that include the evaluation of potential increase in value of an object as well as whether or not she would want to use it. She has rules of thumb she uses for deciding when to invest in an item as well as when to sell it. And there are posts as well as interview data to show her making these decisions and acting on them.

***Subject domains.*** Many of the subjects included in the computer games reviewed in Chapter Two were also evidenced in the *Gaia Online* case study. Savings, investment, purchasing, and entrepreneurship figure strongly in this participant's skills set as a business owner in the virtual world. Others, such as managing credit amounts and buying insurance were not part of Nyght's experiences.

***Saving.*** This subject area includes saving long and short term, delaying gratification and purchases, earning interest, and setting saving goals. According to Nyght, she does not save Gaia gold, preferring to keep her wealth in items. Saar Golde's (2008) article shows that the average Gaian is cash poor; hence they are either broke or have invested their liquid assets into items and cash them out only when they want something else, and Nyght seems to follow that pattern: "If I need money, I sell an item in inventory. Don't need to save money" (Nyght, interview, March 2, 2010). Considering that there is no mechanism for earning interest on money saved in the virtual world, but that items can accrue value over time, it would make sense for residents to keep their wealth in items rather than liquid in Gaia gold. Residents seem to follow a pattern similar to the one Nyght reported in which she sold items at a profit and

immediately reinvested the proceeds into high-valued, highly desirable items. This may actually parallel similar decisions made in the real world since basic savings accounts no longer pay interest while CDs and short-term bonds barely beat the rate of inflation.

Residents understand working toward goals and avoiding expenditures until they attain their primary goal. A few customers in the first shop referred to saving up their gold in order to buy a pet, especially if they wanted a custom pet, which was significantly more expensive than a flat sale pet. They also discuss that they cannot buy certain, tempting things while saving, showing that they can apply money management skills and delay gratification in the virtual world. This is the aim of some games targeted especially at young people to get them in the habit of saving.

During some interviews, Nyght claimed that she did not save Gaia gold. However, in examining the posts in the discussion forums, some saving episodes became apparent. When she reopened the shop, for instance, she announced to the shop customers that she was saving up to establish a guild to facilitate role-playing. “Also, I've decided that I'm going to be saving up pure to open up a guild so that we can have events and prolonged role-play. Yey! If you want to help out, there will be a special post in the guild for donators to be revered for all of time” (Nyght, post, July 4, 2008). The term “pure” refers to Gaia gold, liquidated and not tied up in inventory items.

In *Gaia Online*, there is no designed method of opening a saving account.

Residents who want to set aside Gaia gold, cash, or items create a separate, alternate account that they use only to hold assets that they don't want to use currently. They then trade with this account to put money or items away and take them out when needed. This

practice helps them maintain discipline but also seems to be oriented to keeping private details about their actual net worth. Possibly, this is done to prevent hacking and theft, but the researcher has not seen enough information to be confident in assigning this purpose to the practice.

At any rate, using an alternate account as a savings account is a local substitute for a banking account, but the residents pointed out that this practice has its limitations. A pair of customers talked once about wishing that *Gaia Online* had banks and savings accounts, especially wishing that these accounts would pay interest:

“I wish that gaia [sic] had a bank that you could deposit money into”

“And get interest! Like in neopets [sic]” (customer posts, September 7, 2008)

These customers compared *Gaia Online* to another pet-collecting company, *Neopets*, which had savings accounts that paid interest. In *Neopets*, if one was patient, the interest was apparently a significant sum over time. Lacking such an institution in *Gaia Online* caused residents to find their own ways to informally accumulate and track wealth. Unfortunately, the homegrown methods had limitations. If a resident used a second account to hold gold and hide items, they sometimes ran into the problem of forgetting the password for the second account, which caused delays in moving assets between accounts to finalize purchases.

So, the lack of a designed banking system doesn't prevent residents from coming up with their own solutions. They innovate to fill their needs. They also compare this system against the financial systems not only of the real world but also of other virtual worlds and online games. This shows that they understand concepts such as interest,

understand and can critically compare different financial systems, and have experiences from which they extrapolate principles such as saving money and letting interest accrue, which they would like to apply in their current situation, if there were only an institutional means for doing so.

This is in addition to occasional data points where the participant or customers write casually about the need to save up Gaia gold in order to make larger purchases.

When introducing a new theme of colorations for the canine pets, Nyght enjoined her customers to “save up your gold kiddies” (Nyght, post, September 10, 2005). Customers periodically indicated in the discussion forums that they were indeed saving their funds to buy shop pets, especially the expensive, custom pets. For some customers, saving seemed to be a challenge while others echoed Nyght’s opinion that saving was not difficult. For example, one customer stated that for a custom, “the money isn’t too much of a problem, though. [Pokes her gold] I’ve been saving for a whiles [sic] now, so I think I’ll have plenty” (customer, post, January 19, 2006). However, another customer had worked long and hard to save up the price of a custom and was delighted to be within reach: “[Dances] Almost have enough money for a custom” (customer, post, September, 7, 2008).

This is a minor application of understanding, which some games for young children aim to teach. They have to maintain discipline and watch their balances, purposefully not spending gold on things until they have saved up enough for the major purchase they want. As noted above, some residents create separate accounts to aid them in this task since there is no other way to hide money from themselves. Although, this

method of using the virtual world account feature mirrors a real life practice of opening up accounts for special purchases such as education or retirement.

*Investing.* This subject domain includes diversification, holding assets for the long term, gradual building of equity, able to do investor research, understand calculations used in investing, investment trading experience, and understanding types of investment options and account types.

Investing is a term that may be problematic in the virtual business setting. As it is generally meant in financial literacy, it refers to investing in stocks, bonds, and money market accounts. Nyght uses the term to refer to buying resources for her business as well as referring to her investment in official *Gaia Online* items and holding them. Terms mean different things in different contexts, which is an important point to make in financial literacy learning settings. Nyght is showing sophisticated, expert understanding in using the term appropriately in different situations.

For those who go into business or who just wish to earn money in order to buy better things, investing and holding items while they increase in value is a higher-end activity. In 2011, *Gaia Online* reported an average of more than 100,000 Marketplace auction transactions per day. While Marketplace trading is available to any resident, it may not be a common practice among its average Gaians. There is a small barrier to entry into the Marketplace of 500 Gaia gold. While this is a very small barrier, it may prevent some residents from participating in the market. Additionally, the average age of a Gaia account is unknown. Since Nyght had been in *Gaia Online* since 2005, she had

purchased and held items for as much as five years, which made them both relatively rare and very valuable.

*Gaia Online*'s item market is an area in which the average Gaian can participate, even if they do not decide to run a user-created art business. Nyght had evolved ways to invest more intelligently as she gained more experience in *Gaia Online*. She would use sites such as tektek.org to keep track of market activity and the fluctuation in price of the official *Gaia Online* items. She had a general rule that once an item was worth a "couple hundred thousand gold" (Nyght, interview, March 2, 2010) she should sell it. However, there were other cues. When an evolving item would be in its final stage of revealing all of its forms that is when demand, and hence price, would be highest. Since it could no longer be purchased from *Gaia Online*, interested purchasers would have to go to the user-to-user Marketplace to get it. Since *Gaia Online* has existed for nine years, some items that were for sale early in its history are very rare and extremely valuable. These could be used as an example of the worth of holding investments (such as stocks and bonds) for a long time period to allow them to gain value, as well as pose an example of supply vs. demand in setting prices in the market. However, new investors can get into the market with relative ease and watch their items' value adjust in the market place daily, see trading volume, and watch how value fluctuates over time. Investing in *Gaia Online* items has the potential to be a good way to teach teens as young as 13 about the stock market and investing.

Nyght invested in many of the limited edition items that *Gaia Online* offered, especially when she returned to Gaia in 2008. The earliest of these were the monthly

collectables. Originally offered as a reward for donating funds to the fledgling teen hangout, they became potential investment opportunities because of a couple of characteristics. One characteristic is their limited volume. Since the monthly collectable is sold only during a single month, a limited number are sold. Those that were offered early in Gaia's history, when there were far fewer residents around to receive these thank you gifts, have become quite rare. Another characteristic of these items is that they can be displayed on a resident's avatar or even used to change the avatar into something else such as an animal, a robot, or a plant. Hence, they function as a way to display a resident's taste and wealth throughout the virtual world. Additionally, these items can be very attractive and in demand because of their artistic appeal to residents. There were occasional items that, despite their rarity, did not sell well, but *Gaia Online* developers improved their product line by doing market research, such as in 2008 when they asked residents to vote on preferences. Nyght generally invested in these because "they go up a lot in price when they are no longer available from Gaia. I certainly invest in Gaia items when I know I would want them later" (Nyght, interview, March 2, 2010).

Nyght viewed many of these limited edition items as investments in addition to something to enjoy for herself, and she developed her own guidelines for how and when to invest in and sell official *Gaia Online* items. She would use real money to buy monthly collectables or other limited edition items and wait until they were no longer available. Then, she would go to the fan-created site [tektek.org](http://tektek.org) to find the current market value of the item. She tended to hold an item until it was worth at least "a couple



hundred thousand gold” (Nyght, interview, March 2, 2010) before she would sell it, using the Marketplace price as a guide for setting the sale amount.

Over time, Nyght developed a tacit understanding of when to buy and sell items for investment purposes. Certain events, such as holidays, could be used as a cue because residents would be seeking particular items for dressing their avatars in costume. Nyght also used the market analysis fan site as a guide as well, checking [tektek.org](http://tektek.org) for items that were rising in value in which she could “invest her money” (Nyght, personal communication, December 21, 2008).

While the items and the functioning of the Marketplace are not directly related to running the breedable pets shops, the profits from buying and selling items allowed her to start her businesses. There were several items that Nyght purchased in order to run the businesses but that she did not count as business investments. This can be interpreted in a variety of ways.

Photoshop had to be purchased in order to create the artwork, and Nyght recognized that this was “a lot of money” (Nyght, post, May, 22, 2008). She also invested in the guild space, and even had to save up for it, but she had forgotten about that expense until reminded by the researcher during an interview in 2010.

There were things that she did consider investments in the shops such as the line art, both for the pets themselves and their companion familiars. Nyght framed these purchases as investment in capital. She also felt that the shop as a whole (what that includes is vague in the interview, however) was something that she had invested in.

*Credit and debt.* There was little discussion about credit, debts, borrowing, or loans during the case study. *Gaia Online* does not have a mechanism for borrowing money or purchasing items on credit. Unlike the case of finding creative solutions to the lack of a saving account tool, Gaians did not seem to create socially constructed systems of advancing credit to one another either.

In a very few cases, if someone had a long way to go in order to save up for a pet that was up for sale, a customer or the participant suggested borrowing money from a friend. This was a very rare suggestion, and more commonly, discussions about a lack of sufficient funds for a planned purchase would turn to ways to earn income through *Gaia Online* games and similar activities. In general, any public requests for financial assistance were possibly suppressed by the practices of the breedable pets community. Nyght, like many shop owners, explicitly forbid “gold begging” in the shop forums; hence, any negotiations for financial assistance would have been conducted privately.

The shop itself also did not typically extend credit to its customers. Shop policy required that pets be paid for within a set time frame, although Nyght periodically would have to remind customers to complete their purchases after a major sales event. Custom pets were also generally paid for in advance, through an informal escrow system using the Marketplace trading system.

Hence, at this time, *Gaia Online* is not an environment that is conducive to learning how to manage credit or debt, even in simple transactions. In this regard, it is not unique. Few of the virtual worlds or online multiplayer games have any designed

mechanism for advancing credit either from the game or between players using game tools.

*Purchasing.* This category includes advertising, consumer protection, money and values (O'Neill, 2008) and criteria for making purchasing choices, especially for large purchases, awareness that many large purchases cost more over time than is indicated by the listed price, wise spending choices and personal responsibility, evaluate options and make rational decisions, practice with interacting with businesses, weigh advantages vs. disadvantages of certain choices, ability to use specialized language in order to understand their options from advertisements and converse with sellers and financial institutions, introduce critical reflection of the state of the economy and open up the discussion of collective purchasing power. They encourage learners to compare prices (Bateson, 2009) and spend less (DeTar, 2009).

Based on observations as well as analysis of the case study discussion forum posts, the researcher noted that the purchasing and displaying of items is a major focus of activity and discussion in *Gaia Online*. The Marketplace does over 100,000 transactions per day, with residents buying and selling items between themselves. Residents earn gold in a variety of ways so that they can purchase items for their avatar, house, car, and aquarium. Although it may seem like this glamorizes consumer culture, it also provides young people a safe environment in which to experiment with making purchasing decisions based on various criteria and for different purposes. In *Gaia* at the time, there was no utility to items, unlike many massively multiplayer online games (MMOGs). Hence, usefulness as a criterion is taken out of the equation, simplifying the buying

decision. An item is either for display - something that the user wants to see associated with his or her account - or it is an investment that is hoped will accrue value over time

Functioning as medium for display, avatars can wear many items, and even become changed into other creatures entirely by equipping (wearing) certain items. For example, the avatar of the shop's mule account used to run the shop in this case study wears a dryad costume, appearing as a cross between a human being and a tree, in keeping with the nature mythos of the shop. There is a strong interest in dressing up one's avatar, and users can even enter their avatars in competitions against other users' avatars, letting residents vote on the best ones. High scoring avatars are then featured on the front page of *Gaia Online*, earning their owners prestige among certain circles of *Gaia Online* residents.

Based on interviews and analysis of posts in the shop, the value to the participant was two-fold and shows, at least in retrospect, some sophistication in analysis of purchasing decisions. Nyght, for instance, generally purchased the monthly collectable items as they became available during the first couple of years after she joined *Gaia Online*. These items would be higher valued in part because their supply was limited; they only were available for a month and then would not be introduced again. She would wait to see what the monthly collectables were and then decide if she would buy it. She already understood that each one would be a limited edition and potentially a good investment. But she also had a second criterion that determined if she would actually purchase it. If it were something that appealed to her, she would buy it. She reasoned that if she liked it, others would. If it was something that did not appeal to her, she

reasons that the developers had made a mistake and the item would probably not be in demand, and hence not as highly valued later on. She also had an affective aspect to this decision. She wanted to buy things she liked enough to actually use in dressing her avatar or putting in her house.

*Entrepreneurship.* This subject domain includes business-related topics such as "profit", ability to raise capital, manage finances and plan for the future, evaluate prospective market niches, how to create products for them how to advertise, how to manage customer relations in order to learn the importance of consumer information literacy in e-commerce.

Naturally, entrepreneurship skills and understanding of key concepts play a large part of the creation and management of the virtual business. This echoes traditional, text-based literacy in a participatory framework. In this framework, students develop traditional (and new media literacy) via creation as well as consumption. So, in parallel, financial literacy learners should become more fluent with understanding financial concepts if they are creators and sellers in addition to being purchasers. For instance, they may understand better how advertising influences them if they themselves have been in the position of trying to influence buyers and attract business. By changing their perspective in the market by taking on a different role, they can see more of the system, and see their usual role of buyer more clearly. This is similar to arguments made for teaching reading by having students write, or by teaching them new media literacy by having them create videos.

Nyght was inspired by the successes of others in creating breedable pet shops and decided to see if she could do it too. This reminds me of the learning biographies research being done and how some young women, when exposed to pro-am communities of practice and encouraged by mentors recognize that they are also capable of following the example of their peers. In participatory communities, the barriers to practice are low, and observers can become empowered to emulate their level of creativity. They can get their feet wet in low-stakes situations and gradually improve and learn from their mistakes and initial, low-quality attempts.

She shows a strong entrepreneurial spirit. Having created one successful business, she sold that one and turned the profits right around to create a new venture. When she and her first partner decided they had different goals, they sold the line art and split the profits, which Nyght used to buy the line art for her new shop. While she appreciated working in the partnership, the experience taught her that she preferred to run her own, and she had developed the confidence to do so.

Nyght recognized that a new shop had to offer something new in order to exist in a market that already had established, large shops. As she noted, “a new shop can’t compete with a larger shop. They to have something unique to offer” (Nyght, interview, March 2, 2010). Throughout the case study, she researched customer interests and tastes and continued to buy or create art, hold holiday events, and extend the story in order to attract customers. One way they did market research was through simple polls in the shop itself, asking customers and visitors what their opinions are or what they want to see changed in the shop.

She put quite a lot of thought into what to charge for her pets. She researched with other shops were charging, primarily. This is an area in which the financial literacy of *Gaia Online* may differ from financial literacy in the real world. Or it might indicate a misunderstanding that would need to be discussed if this world was used as a basis for experiential learning. Or it might be an indicator that these businesses are following an emerging model of business, as virtual businesses in participatory communities become more prevalent. Nyght did not take into account covering any of her upfront or processing costs when deciding how to price her pets. She had invested gold on the lineart, the guild space, and the trading pass. But she initially forgot those: “I don’t have any costs ... Well, the purchasing of the lines was a cost. I wasn’t concerned about getting that back, although I probably have” (Nyght, interview, March 2, 2010). Ultimately, she decided on pricing her pets so that they were not exceedingly expensive in order to attract customers with whom to write the collaborative stories. She priced in order to achieve her own goals, but she recognized that she probably had made back her investment.

The case study participant continued to invest in the business after the initial creation of the shop and the base of the pets. She purchased additional line art to create companions for the pets.

Nyght is careful to protect her own income when working with contract colorists. She only pays them after they have created and turned over the colored pets for the commission. Hence, the colorists are paid their cut after Nyght collects the purchase price so that the colorists cannot just take the money without delivering the artwork.

During the case study, Nyght coped with challenges that many small business owners encounter. The business went through growth and contraction periods, and Nyght had to adjust and come up with new strategies to meet various challenges. Like many small business owners, she had to adjust staffing levels and find ways to increase the visibility of her business, for instance. She did not have to cope with many of the growing pains of small businesses, however. She did not need to hire employees or find space for people to work. Nor did she need to manage the production flow or work with managing raw material or processed inventory. So, the business has some features that small business owners traditionally wrestle with, but not all. Of course, as digital media businesses become more common, her way of coping with growth and contraction cycles may foreshadow what authentic business practices will be.

One of the biggest challenges for business owners in *Gaia Online* and in the real world is to attract interest in the shop and turn visitors into customers. In the breedable pets forums, much of the advertising is done by convincing customers to advertise in the shop through their signatures with a banner. The banner would be a combination of information about the shop, the logo, and a link back to the main part of the guild. This signature then appears whenever the customer posts in any forum throughout *Gaia Online*. While this form of advertising is free, it can be a challenge to use in an effective advertising campaign. As Nyght noted, even once a shop owner had convinced a customer to put the shop's information in his or her signature, "then you have to have people posting around with stuff linked in their signature. I've been trying to go places and visit so people see my signature. I don't know how it is going, to be honest. There is



so much traffic on Gaia” (Nyght, interview, July 31, 2010). The need to grow via advertising was something she recognized as crucial. In the summer of 2010, she had four steady customers, but she also recognized that “four are good, but that is not a solid customer base. If they get bored and move on, then we’re done” (Nyght, interview, July 31, 2010). By the time the case study concluded, Nyght had not found a more effective method of advertising other than frequent postings (to keep the shop’s location near the top of the forum list) and signature banners, which were strategies in use by all other shops as well.

*Income/careers.* Income and careers as a topic within financial literacy include aspects such as earning an income, future careers, and making decisions about going to college and choosing a major. Within *Gaia Online*, most of the coverage of this subtopic is focused on ways to earn the local currency, which can be done in a variety of ways, including running one’s own user created art business. Hence, income and entrepreneurship are closely related topics in *Gaia Online*, but they also have distinct and unique affordances as well.

The *Gaia Online* development staff had created a list of 16 ways to earn Gaia gold. These activities fell into a few categories: routine accessing of *Gaia Online* features (games, polls, and forums), putting real money into *Gaia Online* (buying cash items and selling for gold), advertising for Gaia by inviting friends or connecting *Gaia Online* to other social media sites, and by creating art in the mini-shops such as our business owner has done.

Gaians can exist in the world and earn money (both Gaia gold and Gaia cash) by participating in routine events and accessing sponsors' advertisements. Gaia gold is earned a few pieces at a time by browsing in discussion forum postings. It can also be earned by clicking on daily chance icons that appear the first time a player accesses certain pages each day. While this may seem like a very inefficient way to earn virtual currency, one customer in Nyght's shop posted that he was able to earn "about 2k [thousand]" (customer, post, August 10, 2005) in one evening through routine reading and posting in the discussion forum. To put that in perspective, three nights of that level of earning would allow a resident to buy one of the standard pets for sale in Nyght's canine shop at the time. Other customers suggested their favored way of earning gold, although most of their reasons seemed to fall back upon personal preference rather than a reasoned argument for relative efficiency.

Nyght herself generally favored investing in the limited edition items, such as the monthly collectables, which she would hold in inventory until they had either reached a certain value or were beginning to show signs of decreasing value. She would also occasionally simply sell items when she had free time and the inclination to sell off inventory. As she reported, "Whenever I get bored and feel like generating gaia [sic] gold, I'll sell something that I got when I was 15 which is now super valuable" (Nyght, interview, March 2, 2010). Like many other Gaians, she would then reinvest the proceeds into other items that she either had wanted to use in dressing her avatar or into new investment opportunities. Through out the case study period, Nyght would

periodically check her sources for items that were rising in value and hence were potentially good investments.

While Nyght's business was arguably very successful financially, she did not create the pets in order to earn income. She maintained the business in order to have a creative outlet and a community of people with whom to role-play. The amount of income generated by the business was an unintended benefit for her.

*Money management.* Money management in the virtual world was fairly straightforward and basic. The system keeps track of each account's balance of Gaia gold, Gaia cash, and items. Gold and cash balances are displayed constantly on most pages within *Gaia Online*. Items lists are accessible with a couple of clicks. People who engage in trading with other users or who buy and sell things in the Marketplace also can access a history of transactions that shows the date, the person and what was traded or sold. It is fairly basic and does not have many features that a businessperson would need.

There are no basic expenses necessary for survival in *Gaia Online*; all spending is discretionary. While many residents set aspirational goals, they do not generally need to set a budget in order to balance income and spending. They simply continue to earn income until they have enough value in items and or gold to buy what they want. Like many Gaians, if Nyght wanted to buy something, she could sell an inventory item or use it in trade.

Residents also do not need to do record keeping since *Gaia Online* keeps track of their balances in both gold and cash, and displays those balances in the browser

constantly. The system also records all transactions so that residents can review what they have purchased and sold, at least through the Marketplace mechanism.

Advertising is sometimes included in the domain of money management, and there is currently potential for educating students about advertising in conjunction with *Gaia Online*. In the early history of Gaia, the use of this virtual world by advertisers was relatively limited. Since she tended to focus her activities in a limited segment of Gaia, by-passing the main page of the world, Nyght indicated that she never noticed advertising during the case study period. Those who access Gaia Online at this writing, however, will notice that there is quite a lot of advertising activity by outside companies, even in the discussion forum threads. Combining the various ways that companies advertise in Gaia (including creation of items to tie to advertisers) with the need for shops to do their own advertising would be an interesting way to teach the effect marketing has in our real lives.

Money management was an area that showed room for skill development as well as a lack of supporting tools in *Gaia Online*. At the most basic level, the *Gaia Online* account balance system keeps track of a resident's Gaia gold and Gaia cash balances. The Marketplace system similarly keeps track of item sales and trades of items and/or gold between residents. Since residents can check their account status and trade or sale history easily online, they seem to rely upon the system and assume that it will be accurate.

When running a business, the situation can become more complex and at times, confusing. The case study shops, like many similar shops, created a business account, called a "shop mule" that was used to hold and manage the shop's assets. This is a

routine business practice that had become a common practice in breedable pets shops as well. However, shops had their own set of rules for how the shop account was used, especially when guest artists sold their work in a shop. Customers could become confused, prompting them to ask where to send their money - and occasionally getting it wrong.

This system seems generally reliable, with a notable exception in 2005 when *Gaia Online* had to roll back accounts to where they were days prior. This caused a fair amount of confusion in the case study participant's business as the owners and customers tried to recreate transactions from memory.

When people create shops in the user-created art area, they often create separate accounts to hold the assets of the business and make it easier to keep track of sales transactions. This account is commonly known as the "shop mule". When purchasing pets, most shops will have customers send their payment to this account, and the procedure is often listed in the shop's rules. New customers sometimes would confirm that they should send trades to the shop mule during their first successful purchase, but this seemed to be a standard practice across businesses.

This is rather basic and straightforward, but it seems to work well in the base situations. Throughout the case study, users seemed to accept the balances and transaction logs as correct. The researcher did not see any indications that residents or shop owners kept separate records of earnings, expenses, or transactions. If separate record keeping was practiced by the participant, it would be expected to appear during a period in 2005 when technical difficulties caused *Gaia Online* administrators to reset the

accounting system, rolling back to a previous state and making adjustments. This rollback caused some concern at the canine shop that Nyght co-owned at the time, but the problems were minor and temporary. The shop was small enough that everyone waited until the rollback was completed and then relied upon a combination of memory and forum posting history to confirm that pet purchases had been completed correctly. Neither Nyght nor her partner referred to separate accountings to double-check the correctness of Gaia's status at the end of the crisis.

At this point, the partners had experienced a business challenge. For them, it was minor, but they had reports from larger shops that the situation was much worse and messier. Yet, this did not prompt a change in procedure in the case study participant. Possibly, this was because the tools that they had proved adequate to their needs. Gaia also proved itself to be not only reasonably reliable but also capable of correcting its error. Considering that the case study was conducted over five years with this being the only major accounting problem, the trust the residents have seems to be warranted.

*Financial system and services industry.* This category includes understanding the structure or mechanics of the financial industry. Financial literacy authors include a variety of sub topics, including knowing commonly cited economic indicators and how the Federal Reserve Bank operates as well as understanding the capital market system, financial institutions, and taxes. Since *Gaia Online* is not an educational world, many of these topics are not addressed in the virtual world, especially regarding real world financial systems and specific components of the financial system.

In *Gaia Online*, there are many analogs to the financial system and services industry, such as banks, an eBay-like market, and fluid item valuation as well as a stock market reporting analog. Multiple market reporting services existed at various points in the case study. Originally, Nyght relied primarily upon a third-party service run by tektek.org. This fan created site used information from the *Gaia Online* item databases to provide information on market trends. Nyght used it to keep track of the value of her items and the price trends so that she could decide to sell them before value declined unacceptably. At this writing, the official *Gaia Online* system also provided historical information on the market as a whole as well as per item. This gave users experience in reading graphical and numerical information and in recognizing market trends, skills that are part of deciding how to invest money in stocks, bonds, money market accounts, and retirement accounts.

The official *Gaia Online* tool also provided a snap shot of items that are trending up and down at the moment, which was a feature Nyght liked about tektek.org. It gave her a heads up on items that she should evaluate for sale or purchase. She did recognize, however, that short term trends were not the only thing to evaluate when making sale or purchasing decisions. She warned the researcher to adjust the timeline for historical data from the default two days to a longer time period in order to see if a trend was a minor blip in comparison to the past month or longer.

Tektek.org seems to be reducing its service suite or is being discontinued. Some of the features that Nyght describes, such as highlighting trending items, no longer exist. It may have become obsolete as *Gaia Online* has added features to its own site, which

mirrors trends seen with other user-created add on services associated with multiplayer online games such as *World of Warcraft* (cf. Steinkuehler & Johnson, 2009).

Nyght occasionally will comment on how she interprets certain policies and policy changes taken by *Gaia Online*'s developers and administrators. She assumed that the 2% commission taken by *Gaia Online* when an item is sold in the Marketplace was designed to "stop inflation" (Nyght, personal communication, December 21, 2008). She also noted that some residents had found a way to make quite a lot of money in the Marketplace by selling items as soon as new items were available. At that point, prices would spike, and timing the sale "used to be a good way to make money until Gaia stopped it" (Nyght, personal communication, December 21, 2008).

Most interestingly, this virtual world, like many others, has no explicit taxation system, although the Marketplace does charge 2% of the sale price of items sold through the system. This commission is not charged on trades between specific users, however, even if gold is involved in the trade. So, although residents of *Gaia Online* are effectively being charged a sales tax, they do not interpret it as such.

*Economic principles.* Topics in this category include such concepts as supply and demand and how it affects pricing, how competition among businesses can affect quality or prices of products to the consumer, and how borrowing rates affect business decisions to expand or contract product lines.

Various economic principles are evidenced in the data, and Nyght herself commented that "the most remarkable thing to me was how well Gaia represents a lot of



economic models” (Nyght, interview, February 7, 2009), which may reflect the fact that this is one of the few worlds (joining *Eve Online*) to employ an economist.

Nyght recognized and applied the idea of supply vs. demand and the effect on pricing: “... the items, within a certain type of item, are all the same. An item that one user has is no different than the item that a different user has, if they are the same item. So, the Marketplace sets the price because it is exactly what consumers are willing to pay based on how much is available. And that is why the Angelic Halo is worth billions of gold because there are only a few left. Versus the most recent item that came to stores is worth a hundred gold because it has an indefinite supply” (Nyght, interview, February 7, 2009). This is especially true in the user-created art market, where a unique item may sell for millions of gold because people are willing to pay for an extremely rare and desirable item.

There are some concepts used in economics that do not occur in the tangible world. In economics classes, they may discuss the theoretical result of having an infinite supply of an item and how that would affect the market, but since goods generally do not come in infinite supply, it has not been possible to test the theory, until digital media surfaced in these virtual worlds. “Gaia really does represent infinite supply in a lot of items” (Nyght, interview, February 7, 2009).

Nyght was aware of the complex economic system in Gaia and that a change in one area might have consequences in another. When the researcher asked if Gaia allows trading of Gaia gold for government issued money, she theorized that they do not because it would increase “botting” activity, which is the running of automated scripts to do

routine tasks to gather currency or other resources. This sort of “botting” takes place in other worlds, such as *World of Warcraft*, where there is a thriving, if unofficial, gold selling market.

*Insurance.* Insurance is an identified aspect of financial literacy that did not arise naturally in this virtual world. It is not a designed part of the world, and residents did not mention it at any point during the case study.

*Summary.* *Gaia Online*’s breedable pets shops provide an environment in which many types of financial literacy understanding are evidenced, and many traditional topics in financial literacy education are encountered during participation in the buying and selling of these user-created pets, either as a community member or business owner.

In summary, the framework developed in Chapter Two can be used to define the potential areas of financial literacy learning and skill practice shown in Table 9.

**Table 9: *Gaia Online* Financial Literacy Subject Domain vs. Type of Understanding Matrix**

Facet/Domain	Concepts	Application	Behavior	Experience	Identity	Financial Institution
<b>Saving</b>	X	X	X	X	X	
Investing	X	X	X	X	X	X
Credit/Debt						
Income/Career	X	X	X	X	X	
Entrepreneurship	X	X	X	X	X	
<b>Money Management/Budgeting</b>	X	X	X	X	X	
Insuring						
Purchasing	X	X	X	X	X	
<b>Financial system/industry</b>	X	X	X	X	X	
Economic concepts	X	X	X	X	X	

Table 9 shows potential areas of intersection between types of understanding and financial literacy subjects based on the experiences of the case study participant. Actual development of skills and knowledge in other learners would depend upon their actual experiences and ability to recruit mentors to help them make sense of their experiences.

Sections of this table that are in boldface indicate areas in which the virtual world's tool set did not directly support development and practice of skills and knowledge related to the subject area. These were topics, such as savings and money management that residents addressed by finding inventive solutions to common money handling challenges within the limits of the virtual world. Additionally, some topics, such as understanding the financial industry or system, were evidenced by the participant making sense of the systems of *Gaia Online* itself, recognizing that the way these operate in the virtual world is distinctly different from the operations of the more complex real world.

#### **What business challenges trigger learning episodes in the virtual world?**

Both business status changes and business problems resulted in learning episodes and changes made in how Nyght ran the shop.

*Changes in the status quo prompt learning.* A change in the status quo (starting a business, returning to the business after a break, having fewer customers than she wanted, or an increase in business demand) prompted Nyght to make changes in how she ran the shop, and these changes usually required that she learn a new concept, applied understanding in a new way, or adopt new behaviors. Generally, she turned to her social world in order to learn or to be directed to educational materials such as online tutorials.

She reports that she went through many cycles where she would try out an idea, ask for feedback, adjust based on that feedback, and try again.

The first set of business challenges naturally occurred when she opened a new shop and had to learn how to do everything. Since this was a partnership, she was able to recruit the expertise of her college-attending partner as well as make use of her experiences as a customer in shops she had frequented prior to starting her own.

When referring to the opening of the second shop, Nyght mentions some specific challenges, such as deciding how much to charge for the pets. Since this had been a point of discussion with customers in the first business, she wanted to set the price of the lynxes at a level where customers would be able to afford her pets. She employed the strategy of asking people for their opinion and feedback in early posts when the shop opened: “feel free to run ideas ... by me for pricing” (April 24, 2006). Feedback was generally positive toward her policy of making an affordable pet. One customer succinctly noted: “2K [thousand gold]! Great price <3 [emoticon for a heart, indicating that she loved it]” (customer, post, August 21, 2008).

Nyght has identified a period when she came back into *Gaia Online* after a break as a time when she needed to learn a great deal in order to compete with similar user-created art shops. “When I came back last spring, the line art was outdated. The templates were not that good anymore, when I look back on it” (Nyght, interview, February 7, 2009). This is one period in which she went through cycles of experimentation and sought feedback from the people in the breedable pets forums throughout the summer of 2008. She experimented with different artistic techniques in

Photoshop, posting examples in the shop forum and asking customers and friends to pick which examples they found most attractive. By September, she had updated the line art and had learned a great deal about how to highlight and shade her digital art in order to make it more appealing to her customers.

A constructive business challenge occurred beginning June 2009, when the shop was busy enough to require or encourage hiring colorists and managers. These were excellent learning episodes for Nyght because she had to figure out how to hire and then pay her colorists. Deciding how to pay colorists was “difficult to decide. It was easy when it was only me working, but when I took on staff, I had to think about that” (Nyght, interview, March 2, 2010). After researching and talking to other shop owners, she settled on an 80-20 split for regular situations, where there was little customization required. For customized pets, the colorist’s cut went up to 90% of the sale price.

As her shop became more successful, and they started to offer the expensive customized pets, Nyght needed to find a way to let customers bid in items rather than by using Gaia gold. She learned about using [tektek.org](http://tektek.org) to set the value of an item offered as trade in a bid, although she also showed evidence of having been exposed to this idea when the first shop was closed and the art was auctioned off in 2006.

Another positive business change that she faced was the potential expansion of her business from selling pets for virtual Gaia gold to selling them for governmentally issued currency. She had begun doing research on what to charge and how to manage the exchange by going to some of the larger shops. Since nearly all of the major shops were selling real life commissions for real money, she was observing their forums to pick up

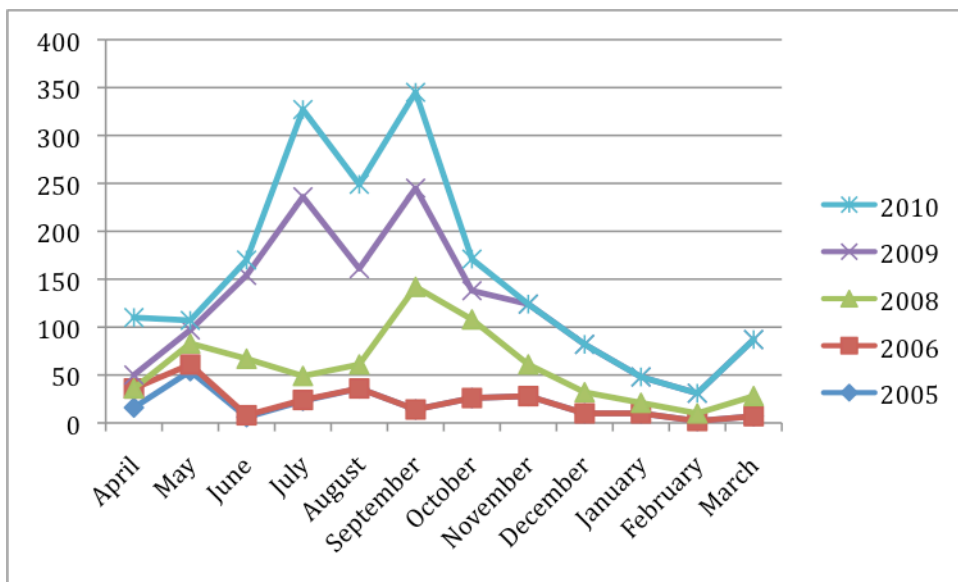
information. She was confident that once she had learned the basics and had gauged what she could charge that she would be able to “try it and see” (Nyght, interview, February 7, 2009). After researching prices and creating a Pay Pal account, the business owner did open up real life commissions and was able to sell a couple of pieces outside of the *Gaia Online* business.

***Business problems.*** A number of challenges over the course of the case study presented Nyght and her staff members with occasions to evaluate and change aspects of their business. The most bothersome of these were the periods in which visits by customers and prospects declined, closely followed by the perennial problem faced by many small business owners, a lack of enough time to both manage the business and produce inventory.

***Business slumps.*** Although the shops experienced periods of great success, Nyght also wrestled with periods in which customer visits and sales slumped. In part, she attributed these boom and bust cycles to seasonal variations. Summer months seemed to her to be traditionally busy periods while interest decreased in the fall and winter. An analysis of the number of posts per month supports her intuition, as evidenced in Figure 14.

Some business slumps concerned her, however, when they appeared out of cycle. For instance, in May 2008, when she returned to the shop after a long absence, business did not pick up immediately, causing her to ask customers for feedback. “I just looked back on old posts when the shop first opened, and I can’t believe how many people found the thread and had an interest right away ... Am I doing something wrong this time?”

Anyone that stops in, feel free to tell me why you don't want to stay" (Nyght, post, May 27, 2008). Business continued to be slow during that summer, causing Nyght to hypothesize that potential customers did not like some of the changes she had made to the appearance of the pets for sale. This initiated a period of experimentation with changing her art and improving her skills as a digital artist while she asked for feedback, suggestions, and customer recruitment from friends and loyal customers. Upon making some changes to the pets' appearance, sales and visitor traffic began to slowly pick up. By September of that year, with the appearance of new line art, the shop was reestablished and returned to its customary seasonal cycle.



**Figure 14: Shop activity measured in number of web pages of discussion posts per month.**

*Lack of time.* Real life events also resulted in business challenges; Nyght went through several periods in which she faced the problem that she did not have sufficient time to run the business. Generally, she would simply warn customers that she would be gone for an unknown amount of time and let the business coast whenever she was unable

to interact with customers. For instance, the long hiatus from June 2006 to May 2008 was prefaced with this post to her customers:

I'm going on a bit of a hiatus to get some relationship and family stuff worked out and hopefully get a bunch of you guys' [pet name redacted] growing, I'm not sure what to do with our unclaimed queen and queen mother, suggestions? Pm [send a private message] if there is something urgent. I'll be checking in, I'm really sorry about all this guys, life is just crazy at this time in mine I'm afraid. (Nyght, post, June 28, 2006)

At this stage in the growth of the business, the case study participant did not have staff members who could have picked up the slack and maintained the daily functioning of the shop. This is a problem that many real life small business owners face; fortunately in the low-stakes sandbox environment of a virtual, amateur businesses, Nyght was able to simply let the shop coast while she attended to other priorities, knowing that she would be able to pick up more or less where she left off.

During the summer of 2010, she attempted something different when she realized that she did not have the time to devote to the shop. She attempted to allow two former customers to manage the business for her while she retained ownership of the business, the concept, and the line art. This turned into a significant episode in which she attempted several strategies before eventually deciding to close the business. Part of the problem was that, like many small business owners, she tried to remain active in managing the business. After handing over management responsibility, she continued on as a colorist while also retaining the rights to the intellectual property and concept. This



led to friction with the new managers over several issues. In one case, Nyght's coloring did not please a customer, and when she negotiated directly with the customer rather than through the shop managers, they became upset. Also, a question about the licensing of the line art came up, and the new owners were not comfortable with the situation. Although Nyght tried to negotiate a more clear agreement that would remove any potential liability from the new owners, this was not enough to appease them. As they struggled for a week to rewrite the shop's rules to accommodate the new line art licensing, the agreement fell apart. Customers became confused and frustrated, but they seemed to have recovered and were still interested in the shop and the art. However, after this episode, Nyght was unable to find colorists and other staff members to rebuild and run the shop. She still did not have time to run it as a sole operator again, and so she decided to close it. While this episode was very frustrating for everyone involved, it shows how realistic the virtual world economy is, in all its messy glory.

Also, a major challenge that she never fully met was the problem of moving her small business into the next category. As she noted in an interview, there are a couple of very large shops that dominate this section of Gaia while many small ones attempt to attract interest. The large shops have been around for many years and have a loyal customer base of hundreds of people who hang out there and role-play. Because they have this critical mass, new people are attracted to the spaces where they can join in and interact with people. Nyght periodically recognized that she wanted her shop to grow. She tried many strategies and asked for ideas and feedback from other business owners, but all of the solutions were quite time-intensive. Ultimately, the small businesses and

the couple of major ones seem to be on opposite ends of an unbridgeable chasm. In July 2010, she reflected on the fact that while she had four very good customers who kept her quite busy, “but that is not a solid customer base. If they get bored and move on, then we’re done” (Nyght, interview, July 31, 2010).

Nyght was very aware that she needed to retain her customers and keep them happy. Customer loyalty was a frequent concern since most “customers come and go. They stumble across the shop, see the pretty pets, and buy one or two. But after a couple of months, they’ll get bored and move on” (Nyght, interview, March 2, 2010). In the summer of 2010, she had a major episode in which the customer was not happy with some product; so she had to exercise her customer relationship skills. She ultimately kept the customer, but this was during the period when she was not managing the shop, having turned it over to the pair of long-time customers who wanted to run the shop. The end result was less than satisfactory.

There were a few business challenges that she sensed were more important than others. When she brought out new pets or expanded her services, she felt that she needed to spend quite a lot of effort to get the price ranges correct. People might forgive experimentation in other areas, but she thought, “once you set the price, you can’t change it ... that doesn’t go over well” (Nyght, interview, March 2, 2010).

Her aesthetic for the shop also changed over time. In 2009, she specifically contrasts her vision of coloration for her pets as being “more serious, not so rainbow colored. You can tell the [pets] – I try to keep them more natural colored – they are not what lynxes would look like in the wild, but they are not rainbows with sparkles and

things. They are not My Little Pony. More subdued” (Nyght, interview, February 7, 2009). Yet, by the time she closed the shop, she had done coloration series that included Carebears, which are definitely outside of her initial color scheme.

She occasionally invested in official *Gaia Online* items that turned out to be poor investments. However, she expected that even her mistakes could eventually appreciate in value, and she recognized that there was really no downside to holding an item in the expectation that it would become more valuable. While she had developed rules of thumb for when to invest in an official item, she did not seem to feel pressure to develop more expertise to avoid making mistakes in this area.

There was an interesting post by a colorist in the business that pointed out a business challenge. Customers who buy a pet basically have a brief period in which they have claimed merchandise but have not yet paid for it. They do not receive the pet until they have completed a trade with the shop account. Nyght specifically had a rule that this grace period was no more than 24 hours after the sale, although in one post she announces the people need to pay their debts to the shop or the pets would be sold to another buyer. It would seem that the rule was not always tightly enforced in this small community, but the shop did have a way to enforce the casual contract.

***Learning strategies in learning episodes.*** Nyght showed that she relied on a few strategies for learning regarding running her business in *Gaia Online*. She often showed “grit” and strong self-efficacy in seeking out resources to help her increase her skills. When she could not find the help she needed from her peers, she would do Internet searches for resources, such as tutorials on how to run Photoshop.

*Asking for help.* Most frequently, she turned to peers in the breedable pets forums. She would post in other shops and ask people for help. From her peers, she received a variety of types of aid. Sometimes, she would be pointed to educational resources either within *Gaia Online* or outside of it. In order to increase her artistic skills, she was pointed toward Photoshop online tutorials at other artist community sites, such as Deviant Art (deviant.org). When she needed to have a means of valuing official *Gaia Online* items, she was pointed to tektek.org and the Lucky Devil price list guide.

Her peers also taught her directly, instructing her in how to use certain Photoshop tools or sharing their strategies for pricing custom pets and working with contractors. She frequently posted in forums to ask for feedback and assistance, and she generally received the assistance she needed. She specifically went out to the forums of other shops to get feedback on the appearance of pets when she was revising their appearance or thinking of the theme for a new line of colorations for the pets.

*Customer feedback.* Nyght would also ask for feedback from customers, in particular asking what people thought reasonable prices would be for pets in a new shop or a new line of pets or services she planned to offer. She pursued this strategy, for instance, when she first opened the canine shop with her partner (Nyght, post, July 12, 2005) and had already fielded comments that their multistage pets were too expensive, especially for a newly established shop. In 2009, when she began to consider offering real life art commissions, this was a strategy she turned to in order to learn what potential customers thought “a fair price would be for the various commissions” (Nyght, post, May 11, 2009). These interest threads seem to be acceptable in the culture of the breedable

pets forums as a way to do market research and evaluate the relative level of interest that might arise for a new product, and various customers in Nyght's shop also posted their own interest threads relating to other shops in the breedable pets section.

*Experimentation.* Nyght also talked about cycles of experimentation as a way that she learned how to not only improve her art but also run her business. With few exceptions, such as pricing of the pets, she felt that she could try out an idea without much penalty. For instance, in the summer of 2008, she experimented with changing the shape of the eyes of the lynxes that the shop sold. In the *manga* style of art, the shape of the eyes is an important feature, and so, Nyght worked to make them larger and more expressive. She showed her attempts to her customers to get feedback while expressing her continuing dissatisfaction with her own results: "I'm sorry that my eyes are creepy ... I'm debating changing them again ... since I'm still not satisfied either ... but I must practice eyes first ... they are so hard" (Nyght, post, August 30, 2008).

*Observation.* Nyght also spent time in other shops, observing how those that she admired ran their businesses. She especially used this learning technique in order to decide how to price her pets, by comparing the pricing of similar quality pets to hers.

*Formal instruction.* While Nyght was aware that some of her formal education explained the systems of the virtual economy she was in, she rarely cites formal educational materials as having been useful in meeting the virtual business challenges. In fact, she dismisses suggestions that her high school computer science class and community college marketing class (which she dropped because it was not interesting) were useful sources. This aligns with some other research being done on various factors

that fit into learning trajectories (King, Johnson, & Hayes, 2012). Still, there seems to be evidence that her experiences and schooling built upon each other, allowing for either transfer from one domain to the other or that one was preparation for future learning in a new venue.

Nyght rarely mentions seeking out schooling or help from teachers or other experts in order to learn new techniques or solve business problems. On the other hand, the researcher knows from observation that Nyght did occasionally ask her parents for help, suggestions, and resources. School, however, contributed to her understanding of economic concepts only informally as she recognized patterns from classes or textbooks that appeared also in *Gaia Online*. When asked if Gaia had helped her understand microeconomics, she was uncertain about the relationship between schooling and experience. As she noted:

It is difficult to tell because I don't know what it would have been like to take micro without having been in Gaia. But I think it was easier for me to grasp certain concepts, especially certain abstract concepts, like perfect competition because it doesn't happen that much in the real world. But because I did have a model, because the Gaia Marketplace is basically perfect competition ... I think it helped me grasp concepts in micro because I had that background to understand these kinds of things. (Nyght, interview, February 7, 2009)

**What concepts do virtual business owners use to frame their business activities and decisions?** For this case study, the business owner frames success in terms of reputation and prestige within the community of breedable pet shop owners as

well as successfully realizing her creative vision. She repeatedly said that having a lot of gold was not a motivation for her, but to have her pets desired was a major factor in judging her shop successful. She would be very pleased when she would open a custom sales event and have people bidding for the right to have her create art for them. In addition, she viewed success in terms of having a sustainable and reliable role playing community with which to carry out her “mad and crazy dreams” (Nyght, interview, March 2, 2010) and plans for the virtual world/story associated with the shop. In many ways, she seemed to view her role as a facilitator of a collaborative, artistic group. Nyght commented once that running shop was a way to earn money, but that it couldn’t be the primary motivation. “It is a pretty good way to get gold if that’s what you want, but running a shop takes so much effort that the gold isn’t really what is important ... I just want to make an awesome community and role-play environment for you guys” (Nyght, post, July 24, 2009).

Of course, she also seemed to be validated by the amounts that they were willing to spend for a pet from her - 100,000 gold each. To put that in perspective, most Gaians, including the researcher, are cash poor and rarely have that much money available in any form. By July 2010, she definitely is talking about success in terms of popularity and gold. Four customers were big fans of her work and “throwing” gold at her to create custom pets and do breedings (Nyght, interview, July 31, 2010).

Certainly, fun also was a part of her estimation of the success of the shop. She enjoyed coloring the pets and having other people value them. When she turned over management of the shop to two former customers during the summer of 2010, Nyght

continued doing the part of the work that she had enjoyed from the beginning. During the July 2010 interview, she noted that, having turned over the business management aspect, she had a surge of creativity and began working on new art for the shop.

Nyght was concerned that her customers be treated fairly and have equal access and opportunity to purchase her pets. This may be in part due to the relationships that develop between shop owners and their customers as well as the fact that these shops are selling unique art in a boutique-style environment. Never the less, the shop owner and staff arranged their work life in order to allow people from other countries and life situations to participate. They were aware of time zones and so avoided flat sales and synchronous chat, indicating sensitivity to the realities of a global marketplace and international work environments. She was also concerned that someone who had a slow computer or slow Internet connection would not be able to compete fairly in the time-sensitive flat sales and so preferred the hybrid selling method called a “flaffle.”

Compared to other shops, she underpriced her basic pets (2,000 gold vs. 5,000 to 8,000 gold). Even her most expensive lines sold for a couple of hundred thousand gold vs. the millions that some shops charged. She wanted to make her pets available to people who wanted to role-play but did not have so much cash. In keeping with the way she framed success, she priced pets so that “even people who can’t afford [a pet] can come” (Nyght, interview, February 7, 2009). Since Gaians tend to be cash poor, this seems like a reasonable strategy to gain market share. She couldn’t give away her pets; she noted in an interview that shop owners have to charge something for the pets so that people value them. But since it did not take her much time (remember that she had an



evolving attitude toward the value of her time) for her to make a basic pet, this seemed like a deliberate weighing of the costs vs. desired outcomes on her part.

Nyght and other residents of *Gaia Online* seem comfortable with the idea that an item's value is not fixed, and she is capable and willing to negotiate price whether buying or selling items or user-created art. Fluid valuation is not necessarily an easy concept for people to grasp. People often tend to think that the price of something is fixed. However, in *Gaia Online*, prices are often adjusting based on current demand for items. Negotiating price is something women in particular are unwilling to do (Babcock & Laschever, 2003), and yet Nyght shows this skill several times during the case study. She, and others involved in the business use a variety of acknowledged value setting sites and options. Furthermore, they allow for the possibility that opinions of an item's value may differ and provide means for resolving these differences by triangulating an item's price as set or reported by multiple sources. From the standpoint of literacy education, this is a valuable finding, showing that when in a context that has deep meaning for the participants, they understand the need to conduct research in multiple places before deciding what is the correct answer.

Time was a resource that she valued differently at different times. Initially, she did not regard time as a cost in either production of pets or in running the business, although early posts show clearly that she felt a time crunch and had to limit her shop activities because of the time devoted to real life activities. She casually mentioned in an early interview (Nyght, interview, February 7, 2009) that creating the pets didn't cost anything, clearly overlooking the many hours she had spend in creating the shop and the

many pets she sold. Eventually, she began to comment on time as a limiting factor that determined how much role-play she would expect of customers, what events she would put into the shop's overarching narrative, and how many customized pets she would create. The shop began to create the more complex pets in the last two years, for which they charged a much higher price because the complexity required more time and effort to produce. In an interview in 2010, she commented that she was not interested in working to acquire more gold because "although there are things that I couldn't afford from 2003, but I don't think it is worth that much time and work to invest in a bunch of pixels" (Nyght, interview, March 2, 2010). By the time the shop closed in 2010, lack of time to devote to the running of the business was cited as the main reason that she and the shop's regular customers had decided to close the digital doors.

Nyght invested in monthly collectables and evolving items with an eye toward their investment value, but she also factored in the question of whether or not she would want to hold them for her own use later. She would not purchase something that she would not personally enjoy and use, making her more of a collector (like most Gaia residents seem to be) than an investor.

She also framed purchasing new material for her business in terms of investing in capital. The original line art, and additional pieces she bought to use as ornamentation for the pets, were the only items that she routinely listed as investments in her business. Other items that outsiders might consider business investments seemed to be in the general operating category - things that she would have purchased and used even if she did not run a business - such as her time, the guild area, the trading pass, and the

collectable items. To her, buying and selling the official Gaia items was separate from running the business, even though this is the way she had amassed her original liquid capital.

**How do virtual business owners reflect upon and learn from their virtual world experience?** Nyght used several strategies in learning, or attempting to learn, to overcome business challenges. She often went out to other shops in the same vicinity to see how they were operating. She had originally started out in this section of *Gaia Online* as a customer and continued to be a customer and community member of other shops. This gave her a ready venue for observation of several successful business communities.

Nyght also relied upon the experience and advice of other shop owners, particularly those who were successful, friends, or whose work she admired and respected. She stated in an interview (Nyght, interview, March 2, 2010) that business owners, even the big ones, in this forum section tended to be very friendly and willing to answer questions, give advice, and offer feedback. They did not see other shops as competition but rather as providers of pretty art work that they all might want to purchase and display. The creative community seemed happy to have talented people contributing to the growth of artwork for all to admire. This group definitely does not evidence a zero-sum mentality.

The researcher noted that Nyght did ask her parents for advice at times. She turned to her mother, who had been a business manager, for advice on how to give critical feedback to colorists whose work Nyght did not think was ready for sale, and she

asked for help from her father, who is in the financial services industry, in establishing her real life business during that period of experimentation. Her working strategy seemed to serve her well. She would ask for advice, try it, and come back for more advice if she did not get the results she wanted. This is an example of experimental learning in practice.

This informant perhaps exhibited more self-efficacy than most *Gaia Online* residents in responding to challenges by finding people who could help her and give advice. However, other researchers (cf. King, 2011) have noted that when learners are deeply committed to an interest-driven project, they will seek out help and resources in order to understand and self-correct behavior that is not getting the results they want. This can be true of teens that are pursuing a hobby (King, 2011) as well as adults who seek to improve their own skills for work or leisure (Brookfield, 2005).

Mitgutsch (2011) had lamented that his informants were often not capable, even as graduate students, of reflecting upon remembered experiences and drawing conclusions about their thought processes. In contrast, Nyght was a very helpful informant for this type of research. Her willingness and ability to reflect upon her own learning process may be unusual and stem not only from her up bringing but also from participation in prior qualitative studies in which she was asked to reflect upon her gaming and virtual world experiences.

When reflecting upon what she has learned, Nyght often refers back to experiences she has had and what they taught her. For instance, she ran her first shop

with a partner, and while that was a positive experience, she decided that she preferred to own a business on her own.

There are some points where Nyght says in the forums that she's going to make changes based on what has happened - usually because some event flopped. For instance, her attempt to market pets colored red, white, and blue for the U.S. Independence Day holiday was unsuccessful, she announced: "I don't think we're going to do for just American holidays anymore" (Nyght, post, July 22, 2005).

**How does experience in a virtual economy influence their confidence in managing personal finances?** Nyght currently seems confident in managing her money and makes decisions based on experience and assessment of risk. She has banking accounts and a credit card, which she manages all online with online account access and online statements. She is sophisticated enough to have set an alert on her credit card so that she is informed of charges that are more than \$100 at a time. She admits that she used to balance her checking account monthly just to be sure that all of the purchases were legitimate, but she has let that practice lapse since she did not find any errors while doing this for several years. To be sure that nothing unusual is occurring, she does check the balance online periodically. In her senior year of college, she rented a house with some friends and was functioning as the group's treasurer: making sure the lease was signed, utilities turned on and paid for, and that they remain in compliance with the terms of the lease.

When Nyght was having difficulty finding a real life job in 2008, she decided to leverage her virtual art business to earn real money by offering to create custom pets for

customers. Drawing on her observations of other shop owners, she established a Pay Pal account and began advertising her new real life digital business through her virtual one. She even investigated how this new endeavor might be affected by the virtual world's terms of service, obtaining permission to do real life commissions so long as they discussed the details outside of *Gaia Online* space (Nyght, post, July 30, 2009). Using this system, she was able to complete a couple of commissions for custom versions of her virtual pets.

She also began to explore additional expansions of the business into producing not just digital art but also producing printed versions for sale. She incorporated her business with her father's help, developed an online sales website, created contracts for other real life artists, and was in negotiations with some potential producers. She ended this effort when she realized that running a real life business at a distance would not work as smoothly as running a virtual business. However, this effort suggests that she was able to transfer concepts, application and even initial behaviors from the virtual world to the tangible one. This expansion of her business from the virtual to the real world shows an interest and ability to transfer what she had learned in the low-risk playful setting to real world systems in order to solve real financial challenges.

**How does experience in a virtual economy influence their development of identity as a financially literate person?** Nyght never explicitly identified herself as financially literate, but enacted financial literacy by adopting behaviors appropriate for her age and current stage of life. As noted in Chapter Two, the most frequently cited markers of financially literate behavior are saving for the future (especially for

retirement), avoiding excessive credit, and understanding financial information in order to make decisions. Within limits for her age group and life stage (Milevsky, 2010), Nyght does enact these financially literate behaviors. Near the end of the study, she began to operate as a financially literate adult in the real world, opening savings and checking accounts and applying for a credit card, which she pays off each month. She maintains a budget, using a spreadsheet program and saves money for college. She negotiated a house lease and took responsibility for collective payment of expenses for her housemates and herself.

She shows a strong entrepreneurial spirit. Having created one successful business, she sold that one and turned the profits right around to create a new venture. When she and her first partner decided they had different goals, they sold the line art and split the profits, which Nyght used to buy the line art for her new shop. While she appreciated working in the partnership, the experience taught her that she preferred to run her own, and she had developed the confidence to do so.

Nyght views herself as having become more skillful because of her work in *Gaia Online*. She recognizes this in part because she was aware that she was not skillful and deliberately sought feedback from respected peers and used that feedback to improve as an artist, a digital media producer, and a manager. She considers herself successful because she had external validation from customers who wanted her art and were willing to pay hundreds of thousands of Gaia gold to get it.

She also knows that she developed what she referred to as social skills: “Learned to work with people and manage people. And learned to as nicely and politely as

possible tell people that they have to be more responsible or they can't work for you.

Making decisions on who to hire and not to hire. Hard to tell people that their artwork is not good enough and you won't pay them for it – that they have to practice and better at it. Market research ... learn what customers want” (Nyght, interview, March 2, 2010).

Although she did learn to work with people, especially manage them, she also developed the confidence to create her own shop from scratch after a couple of years of partnership with another person.

She viewed herself as operating professionally, even through the ending crisis, although others involved contested this evaluation of her actions. She pointed to her attempts to keep the customers happy and maintain a public image of the shop as successful and properly managed while conflicts among the staff went on behind closed doors. “While I do my best to keep staff problems out of the thread, some bad apples just refuse to respect that this is a business and that professionalism is more important than anything else” (Nyght post Oct 19, 2010). To her, she had been professional in dealing with the friction between her and the new managers by using the private staff forums and private messages. In fact, most customers had no idea that conflict existed until the shop was being closed and staff members posted about the challenges in the public forum.

Unfortunately, Nyght was too busy with school and work to try to save the shop after the conflict with her managers had ended. She thinks that bad press and possibly active black balling had cut off her supply of willing staff members, especially colorists. So, she closed the shop, ending the era of her life. However, she continued to use digital



media as an outlet for her creativity and went on to create games for computer science classes, especially using some of the ideas she had explored in *Gaia* to create evolution algorithms.

### **Result of Study**

Chapter Two summarized the results of prior financial literacy education computer game studies, the majority of which presented computer games or simulations designed for educational interventions, either in the classroom or in community-based, informal educational situations. The majority of these were exploratory studies, reporting on computer games in development or in early testing stages (Chen et al., 2010; DeTar, 2009; Iliev-Piselli, 2011; Iliev-Piscelli et al., 2011; Liu et al., 2010; Pereira et al., 2009). Hence, many focused not on how much the participants learned regarding financial literacy but rather on whether or not the game was playable and enjoyable. While this may seem a trivial question, as Way and Wong (2010) pointed out, the use of digital media in education is frequently *assumed* to be engaging for students without critically testing the assumption nor exploring the factors that may contribute (or detract from) successful learning. While discussion of some potential success factors is postponed until Chapter Five, the studies reviewed in Chapter Two along with this study confirm that financial literacy learning through digital media is engaging and even enjoyable. Nyght, her customers, and her staff members were deeply committed to succeeding in the virtual world and in having fun during the five years of the case study. This is particularly significant since *Gaia Online* is not an example of the 3-D graphics game that is often cited as a necessity for engaging the digital native student. Millions of users

continue to participate in this virtual economy, suggesting that financial literacy educational games and simulations do not need high development cycles and budgets to be effective.

Those studies that focused on assessing student content learning took both quantitative and qualitative approaches. Quantitative studies employed multiple-choice tests ranging in depth from multi-page assessments (Harter & Harter, 2010; Hinojosa et al., 2010) to short quizzes (eg. Stickel & Garcia, 2010). When a pre/post test protocol was employed, these studies generally showed gains in student learning, with significant results from the controlled, randomized evaluations of the *Stock Market Game* and curriculum.

**Financial literacy learning in this case study.** The evaluation of the financial literacy of the participant in this qualitative, case study followed the lead of several other qualitative studies by evaluating the expressive and behavioral understanding evidenced by the participant (DeVane, 2009; Horton et al., 2002; McClenaghan & Aslam, 2009). Using the subject domain table (Table 1) and taxonomy of understandings (Figure 3) as a framework for evaluating financial literacy of a person in a natural setting, the case study participant showed mastery of various – but not all - aspects of financial literacy.

Nyght showed competence with subject domains such as saving and investing, making purchases, earning and managing money, entrepreneurship, the financial system of *Gaia Online* and the real world, and various economic concepts. Credit or debt management knowledge or skill was not strongly evidenced in this case study because, at least in part, the environment of the case study does not support lending. *Gaia Online*

also does not appear to support a need for learning about insurance; hence Nyght never showed her understanding of this content domain, but she also did not evidence a lack of understanding either.

The case study participant showed a broad coverage of the various types of understanding associated with financial literacy. She was able to express conceptual understanding of ideas and apply them in making decisions regarding purchases and maintaining her business. She had a variety of experiences over the five years of the case study, reflected upon many of them and adapted her behavior as a result. Many of the business challenges (and resulting learning episodes) she faced arose as a result of changes in participation by customers and staff members, showing the benefits of financial literacy learning in a safe, social setting. Nyght also showed evidence of considering herself financially literate, especially in interviews. Her identity as a financially literate person contributed to her behavior as a virtual business owner, but it also paralleled enactment of real world financial literacy behaviors such as managing saving and credit card accounts, negotiating leases, and selling digital goods using PayPal. In the virtual world, the case study was able to investigate only limited relationships with financial institutions since *Gaia Online's* toolset only provides a resident-to-resident trading mechanism. In the real world, Nyght's financially literate behaviors all were mediated by relationships with financial institutions.

Given the nature of the naturalistic case study, it is unclear how much learning took place during the case study period or how much of it can be attributed to involvement in the virtual world business. Nyght showed increasing sophistication in

some of her behaviors during the study. She progressed from being a partner in a shop to running one with a staff of seven people, for instance. She also used a wider variety of strategies to market her business and to manage sales events, drawing on resources from a large learning ecology that included other vendors, customers, formal education, and professional parents. What is certain is that the breedable pets shops section of *Gaia Online* with its associated social practices provided a rich sandbox in which she could practice with a wide range of financial literacy domains and levels of understanding.

**Revised subject domain list.** As discussed earlier in this chapter, financial literacy in the user-created art section of *Gaia Online* revolves around nuanced use and ownership of intellectual property: the collectable, unique pets each shop creates and sells. Careful analysis of the process reveals that these pets are often created not by one person, but through a production sequence that may involve up to four people: the line artist, the shading template creator, the colorist, and the certist. In the breedable pets forum, it is customary to purchase “the lines” (the black and white lineart) and negotiate the right to use them to create colored art for resale without royalties back to the original artist. While this type of purchase agreement is customary and essential to the functioning of the shops, each line artist has his or her own version of the agreement, requiring shop owners to understand and make decisions about buying and using intellectual property. The same shop owners have their own agreements with contractors, who contribute to the creation of the pets without gaining an ownership stake in their creation, and customers, who generally own limited rights to use the pets and display them in certain areas of *Gaia Online*. Throughout the breedable pets forums, these teens

and college students are creating and enforcing their own system of intellectual property rights that often mirrors the functioning of intellectual property law in the real world.

The topic of property does not fit easily into any of the existing financial literacy subject domains listed in Table 1 above; it seems to cross over and fit into several categories. Purchasing is certainly a possible classification, but given that intellectual property is also used as a base for creating business products, it would also fit into investing or entrepreneurship. Additionally, since these transactions are complex and require understanding and managing the affordances of the financial system of either the virtual or real worlds to complete, instances where this topic arises in the data could also be located in the financial system topic.

Since the topic of property, particularly intellectual property as digital media, is one that is gaining importance in our economy and has an increasing large impact on the lives of young people, the researcher proposes that it should be listed as its own subtopic in financial literacy, resulting in the list shown in Table 10. This would encourage greater coverage of property in financial literacy education courses and could especially address current issues in intellectual property use, ownership, and distribution such as copyright infringement, mashups (inclusion of another's work in your own), and licensing of one's own digital work. As shown in this case study, this topic is of immediate and strong interest to young people who are working through complex issues and developing social norms around intellectual property in virtual worlds. In fact, for many of them, this is one of the most engaging topics in financial literacy at this point of their lives.

**Table 10: Revised Subject Domain List**

Facet/Domain	Concepts	Application	Behavior	Experience	Identity	Financial Institution
Saving						
Investing						
Credit/Debt						
Income/Career						
Entrepreneurship						
Money Management/Budgeting						
Insuring						
Purchasing						
Financial system/industry						
Economic concepts						
Property						

Results of this case study suggest that the topics included under the financial literacy umbrella should be expanded, and it also raises a challenge to the taxonomy of types of understanding used to define a financially literate person in Chapter Two. The model of these types of understanding and how they relate to one another, shown in Figure 3, does not accurately describe the experiences of the case study participant and her customers in the virtual world of *Gaia Online*. Discussion of how the taxonomy and model should be revised, however, is delayed to Chapter Five to follow the examination of critical financial literacy in *Gaia Online* as well as draw upon an example of an informal financial literacy learning environment familiar to many middle-class U.S. residents.

## Critical Financial Literacy

In Chapter Two, some critical financial literacy themes emerged while evaluating prior studies of financial literacy education through computer games, virtual world simulations, and other digital media. Some of these themes also emerged in this case study.

**Discourse.** As discussed earlier in this chapter, Nyght made use of specialized language and terms in describing how she functioned in the virtual world and made decisions relating to her business. In interviews and in the discussion posts she fluently used the discourse of finance and economics to accurately express her understanding and to request actions on behalf of her customers, such as to liquidate assets in order to pay for a pet. While customers seemed to understand her requests, they did not emulate her use of specialized financial terms, resorting to describing financial phenomena using either common English or locally recognized terms. Just as residents socially developed methods to extend the limited financial tools of *Gaia Online*, they also developed their own terminology for certain concepts. Instead of talking about liquidating assets (a phrase that Nyght used), customers would convert items to “pure” Gaia gold. Both expressions name the same concept, but customers did not tend to adopt the specialized finance language employed by Nyght to express their understanding of the concept that they routinely applied.

There were a few exceptions, however, in which outsiders and recognized experts employed financial discourse. They were generally Gaians who were engaging in more sophisticated, highly engaged practices, such as the writers of the pricing guide, the

owner of a line artists' marketing agency, and the creators of the market analysis service tektek.org. As is discussed in Chapter Five, the case study participant shows characteristics of being an outlier among residents of this virtual world. Her background as an upper-middle class child may have enabled her to use financial terms *expressively* while less privileged users seemed to be able to *understand* these terms in context. Further research (see Chapter Five for details) in discourse analysis as well as using Gaia Online as part of a financial literacy course will be necessary to evaluate how specialized language is used, and possibly adopted, as residents participate in the virtual economy.

**Socio-economic status.** Within the context of the virtual world, Nyght deliberately chose to work against market forces in pricing her pets. She deliberately created a line of collectable pets that she priced under the general market in order to attract and retain creative customers who would become loyal to the shop (Nyght, interview, March 2, 2010) rather than let demand for the unique pets drive the prices for the entire line up to levels seen in other shops. In this way, she was sensitive to the reality that expensive pets can only be purchased by residents who either have real world money to use for investing in the limited edition items or are willing to spend extreme amounts of time earning Gaia gold through in-world activities. She framed her concept of success not in amassing vast amounts of virtual money but in terms of attracting creative customers no matter what their socio-economic status was in the virtual or real worlds.

While most Gaians do not share their real world identities in full, many long-term customers of the shop mentioned aspects of their lives in casual conversation. Many of



Nyght's customers during the case study indicated that they were students, either in high school or college. However, some shared details of their lives as adults, often including the struggles with their status as lower-income people, single parents, disabled people, or parents with disabled children who needed a social outlet. In this way, high school and college students were exposed to the realities of people in socio-economic groups that might be different from their background. They became more aware of the financial realities and decisions faced by a wider range of people while engaging in their own experimentation with managing finances. To their credit, the customers in Nyght's shops were supportive of their friends, even friends who evidenced challenging financial situations that were outside of their own experiences, without falling to the temptation of prescribing solutions from their own financial backgrounds.

**Rationality of purchasing decisions.** One of the assumptions of financial literacy is that financially literate people will make decisions, particularly major purchasing decisions, based on rational reflection. In Chapter Two, authors in prior studies question this assumption. This is most clearly seen in the game design study by DeTar, who designed a mobile app to encourage users to quantify their affective response to a recent purchase (2009). In this case study, the participant evidences both rational and affective decision making approaches to her purchases. As discussed earlier in this chapter, she had developed strategies for choosing what items to purchase as investments and when to sell them in order to make a profit, using tools to alert her to both sales and purchase opportunities. In these events, she exhibits a very rational approach to buying and selling items in order to improve her net worth and achieve financial goals. She even

employs her own affective response to an item to evaluate its potential worth, judging that her artistic taste was an accurate predictor of the future value of an item.

However, Nyght also exhibits the affective dimension in some of her financial decisions. She purchased items, particularly for decorating her avatar, simply because she wanted to do so and had available money (Nyght, interview, February 7, 2009). She was deeply engaged and committed to her business success in *Gaia Online*, but she also was strongly motivated to have fun with it and made purchasing decisions based on this desire. In combining both rational and affective decision making criteria, Nyght's behavior aligns with emerging theories of behavioral economics being developed by Daniel Kahneman (2011) in which financial decision making is comprised of both rational and non-rational processes. This emerging field will have an impact on how financial literacy researchers and educators evaluate how people apply their understanding of financial concepts in order to make decisions and adopt financial behaviors that do not fit with current models of rational money management and financial literacy (Willis, 2011).

**Country differences.** As discussed in Chapter Two, most of the financial literacy computer games and virtual world simulations studied by academics do not explicitly address potential differences in financial literacy as practiced in different countries. At best, Jones and Chang (2012) raise the issue that the assessment of financial literacy used to evaluate the student outcomes in their study is appropriate for Canadian citizens since it relies upon some knowledge of the economic processes and policies of that country.

The majority of other studies focused on the personal nature of teaching people to function effectively within the economy of their own situation.

In contrast, *Gaia Online* is a global community. Its 23 million (Gaia Interactive Inc., 2011) unique users physically reside in many countries. Since country of residence is not a required piece of information during account creation, it is not known how globally diverse the residents are, but there are many guilds devoted to use of languages other than English as their primary language, appealing to people throughout Europe, Asia, the Americas, and the African continent. Because of its origins as an online location to share and discuss the Japanese art forms of *manga* and *anime*, this virtual world seems to attract users interested in other cultures, allowing them to interact with one another in a socially constructed cosmopolitan space. The environment fosters opportunities to meet and work with people from other cultures.

In this case study, Nyght's business activities were gradually shaped by the requirements of selling to and employing people from other countries in a virtual business environment. As noted earlier in this chapter, many activities that were normally conducted synchronously evolved into asynchronous forms. Flatsales, in which the first person to post "wins" the purchase of a particular pet, evolved into the flaffle, which allows people to indicate their interest in purchasing a pet over a period of time, thus avoiding the exclusion of people from different time zones. Synchronous chat was also generally avoided, even once the tools were added to *Gaia Online*, for similar reasons. Nyght employed a colorist from Hungary who was unable to meet with the rest of the staff members; hence, staff meetings were conducted asynchronously. This had

the side benefit of making a permanent record of the meeting while also allowing additional time to read and compose messages in English, which was not the first language of some customers and staff members.

While English is generally the *lingua franca* of *Gaia Online* (it is a U.S. company located in California), as mentioned, English is not the only language used. Some guilds are devoted to use and practice of other languages, and even in Nyght's shops, there are occasional exchanges in German and French. Neither the case study participant nor her customers explicitly engaged in critical discussions of how their economies or personal financial practices differed from one country to the next, although Nyght quickly learned that holidays celebrated only in the United States (such as the 4<sup>th</sup> of July) were poor foundations for special sales events. Instead, this business and others are engaged in playful practices that may foreshadow how businesses will function in the increasingly global economy (Edery & Mollick, 2009; Wagner, 2008).

**Digital age practices.** *Gaia Online*, like many of the financial literacy computer games and simulations reviewed in Chapter Two, provides residents with information about their accounts and inventory in digital format. This situation emulates the emerging practices of accessing and managing personal financial information, particularly banking information, online. Residents can easily check their current balances, review Marketplace trade history, and sort through inventory by logging into *Gaia Online* either via a computer and the Internet or the new mobile app. In many ways, the functioning of this virtual world's financial information tools provides residents

with an authentic, current experience that rivals that of the most cutting edge financial institutions.

In addition, like *Pecunia* (Jones & Chang, 2012), the virtual world also provides learning situations in which errors and technical problems in the online financial information system can impact the ability of residents to function. While these situations were designed in *Pecunia*, they occur naturally, and quite inadvertently, in *Gaia Online*. The economic reset of 2005 was the most visible and disruptive of these occasional reminders that errors can occur in online transactions and account reporting. Hence, participation in the virtual world business can both foster comfort and fluency with online financial management while also serving as a low-stakes environment in which to develop their own strategies for minimizing the impact of these errors.

## **Conclusion**

This study focused on exploring how the development of a business in a virtual world facilitates the development of financial literacy among teen and young adult business owners. During this case study a number of factors and strategies have been emerged as significant features that support the development and practice of financial literacy.

**Experiential learning environment.** As is discussed in Chapter Five, in many cases, the case study participant had experiences that gradually lead to the development of understandings of financial literacy concepts. These experiences often preceded, especially early in the study, formal courses in economics. Hence Nyght often did not have the terminology or conceptual framework with which to understand the observed

phenomenon, but she relied upon mentors and the social network of the breedable pets forum in order to ask for help in understanding what she had experienced and to choose appropriate strategies in response. Nyght frequently went through cycles of experience, reflection and strategizing with others, forming a new approach to the situation, and then testing it out, similar to Kolb's classic four-stage experiential learning cycle (Kolb, 1984).

**Social environment.** In researching serious computer games and virtual worlds for education, much of the attention of studies is devoted to the functioning of the technology itself. Although *Gaia Online's* developers provide some financial literacy information and tools that can support financial application and behavior, the majority of the challenges and support for practice and learning in this environment come from other users. The virtual economy and related tools essentially provide computer-mediated communication and facilitate actions that users could take in the real world. Hence, Gaians and the business owners within the user-created art community interact in authentic, unpredictable ways. This means that participants in the virtual economy cannot become complacent, clicking on buttons mindlessly after they have established a reliable pattern, as it often the case in computer games. Business owners, such as Nyght, are constantly assessing the situation and adapting their behaviors in order to maintain a successful business in this virtual world. This affords many business challenges that, if they want to remain in business, cause them to refine their understanding of how the local financial system works and can be employed to meet their needs.

The social environment, at least in the breedable pets section of *Gaia Online* was also a source of support and helpful feedback. As noted in the case description and throughout the rest of this chapter, Nyght frequently asked for help and feedback from customers, vendors, friends, and even competitors. She was generally rewarded with help, resources, and advice that enabled her to improve her understanding of how the virtual economy operated.

**Subject domains and levels of understanding.** Finally, the *Gaia Online* supports financial literacy practice and development through the richness of its economy, its tools, and the social practices of the community it has attracted. Table 9 summarizes the subject domains and types of financial literacy understandings that Nyght evidenced during the case study. As detailed in this chapter, most subject domains of financial literacy are employed during participation in this virtual world's economy. Two exceptions are use of credit or debt management and the need for insurance. The first was not evidenced in part because early negative experiences (described by Nyght but not appearing in the data) had led Nyght to refuse to let customers buy on credit or using installment options. The second, insurance, is a topic unlikely to surface in a world of digital goods.

In examining the coverage of types of understanding (see the NVivo detail in Figure 9) evidenced by the case study participant, it can be seen that *Gaia Online* supports a broad range in the levels of understanding in which residents can participate. As detailed earlier in this chapter, users are exposed to concepts, apply them in making decisions, gain experience, interact with simulated financial services (to a limited

degree), and are free to choose and enact a wide range of behaviors relating to personal finance. Those who create and maintain businesses in this virtual environment are engaged in very high levels of understanding, analogous to the highest order of thinking skills in Bloom's new taxonomy: creation (Krathwohl, 2002).

The next chapter will frame conclusions with a description of two typical cases of informal learning through playing business. These stories will be used to frame the value of play activities as foundations for financial literacy and economics learning. This will lead into a discussion of the research question: how virtual worlds support financial literacy learning. The chapter will then conclude with a discussion of the study's limitations and opportunities for future research.



## Chapter Five – Conclusions

This chapter begins with two stories of young people playing at being entrepreneurs, one operating in the real world and one in the virtual, exploring what might be a typical workday for each and what they might gain from their experiences. Stories are commonly used as part of reporting the results of case studies, aiding the reader to better understand the particularities of the case in order to understand and situate the findings (Creswell, 2007). For the purposes of this case study, a story familiar to many readers will set a framework for the second, which is strange to many educators who have not played serious games nor participated in virtual worlds in any depth.

The virtual world example will then be used to illustrate themes and answer the research question of this case study: How does the development of a business in a virtual world facilitate the development of financial literacy among teen and young adult business owners? The chapter will then conclude with an examination of the limitations of this single-case study in a virtual world that suggest areas in which future research should be pursued regarding financial literacy learning in virtual worlds.

### **Playing Business**

**The lemonade stand.** On a typical summer day in a middle-class, Midwestern city, a young girl sets up a lemonade stand. She has set her sights on saving up money for a coveted toy, and knowing that her allowance, even carefully rationed, will not help her achieve her goal, she has decided to go into business. She has seen other kids selling lemonade and Kool-Aid this summer, and she thinks this will work for her too. She talks her mother into approving the scheme and sets to work.

A likely corner is chosen in which to situate the stand. It needs enough traffic, she knows, so that there will be customers, but it also cannot be so busy that thirsty drivers will not stop. It needs enough shade so that she is comfortable all day, but it also needs to be sunny enough so that people can read her sign. It also cannot be too far away from the house, since she hopes to run back and forth all day to get more lemonade, and part of her also realizes that her mother will want to be able to see her from the house.

A table gets moved out and decorated. The young entrepreneur creates a sign. She is not quite sure how much to charge for a cup of lemonade; so she asks her mother. “Will people pay a dollar for a glass of lemonade?” Her mother gently smiles and suggests that a quarter is more likely to get paying customers. This dismays the young child, who considers how long it will take to earn the money she has set as a goal, but the mother points out that people won’t buy lemonade that is too expensive and so she would get nothing. This way, she will actually have many more customers and will earn money, probably faster. The young child proudly writes down the price of her wares on the sign.

All that is left is to mix up the lemonade. She puzzles out the instructions, adding water and sugar to the lemonade mix. The child needs some help. Although she can read, she is not yet familiar with the difference between the various kitchen measures and has never actually made anything in the kitchen before. The first batch of lemonade is too sour; and she learns to be more careful in measuring and mixing before she carries her product and some disposable cups out to the stand. She knows to bring the cups because she has been to other lemonade stands, and they always use the little bathroom

sized cups. Smiling, she begins to shout “Lemonade, ice cold lemonade” to attract attention.

Before long, she has sold a few cups of lemonade, mostly to her mother and a friend who stopped by to help out. Then, she has a real customer in a driver who stops by. But this person does not have a quarter with him. All he has is a few dollar bills. He does not want to pay a whole dollar for a little cup; so he gently reminds the young shopkeeper how to count up change to make a dollar. Leaving a quarter with her, he takes his lemonade cup, spilling a little of it by accident. Apologizing, he mentions that she really should have a rag or some napkins available to clean up spills, or else she will soon have ants or, worse yet, bees and flies bothering her.

Dismayed at forgetting this detail, the young girl sends her friend back to the house to get napkins and to see if mom will mix up another batch of lemonade for her while she tends the stand. With business going so well, they surely will need more lemonade and ice to keep it cold. As the man drives off, a proud smile crosses the girl’s face. She had a success in her first real customer. It makes her proud to know that she can have a stand like other kids, and she is just sure that she will have that toy in no time as well.

**The virtual pet store.** On the same typical day in a middle-class, Midwestern city, Nyght starts her business day by opening up her laptop and logging into her shop in *Gaia Online*. Although she had begun the business purely for fun, the lagging economy has made finding a summer job difficult, and she is hoping that some real life art commissions will help her pay college expenses. Her first order of business, therefore, is

to check in with customers on the shop's main discussion forum. She reads over what people have posted since she left last night and takes a moment to create her own post in response, greeting new people and replying to any questions or comments that her Thread Manager has not already addressed. She has learned from experience that customers, especially long-term customers, like to hear from the shop owner periodically. Besides, any activity in the shop's discussion post will cause the shop to – at least briefly – appear at the top of a list of businesses in the breedable pets section, which is one of the most reliable ways of marketing her shop to new people. Nyght next checks to see if any of her employees are currently logged on. Since she seems to be the only staff member currently in the virtual world, she will keep an eye out for new responses in the discussion forum while she does other work.

Since they just completed a virtual pet sale, she takes a moment to log off her personal account and check the records of the shop's joint account. Comparing the list of pets recorded as sold to the trade requests, she knows that – this time – everyone has paid for their merchandise on time. She also compares the trade records to be sure that each colorist was paid the appropriate commission, leaving the shop 20% of the total sale amount. A quick glance at the total amount held in the shop account tells her that, if desired, she could buy new line art to dress up the pets with something new to attract more business. Customers seem to be willing to invest in decorations and accessories for pets that they already own. This side venture had been successful in her very first shop, and it might be worth trying out in this one as well.

Nyght next checks her personal messages, the local equivalent of email, to see if she has any responses to her call for new colorists. Her shop will be joining others in hosting a large, forum-wide summer Flower Festival, and she knows that the shop does not have enough staff members to meet the demand that comes from this event. She has a few messages from new colorists who have attached examples of their work. A couple of respondents look promising, but one of her customers – who wants to become a colorist – has also submitted samples that are still not up to par. The shop owner has been asking friends and even family for advice in how to give helpful feedback to this aspiring artist. Nyght does not want to discourage her, but the artwork just isn't up to the expected level yet. Sighing, she sends back a message to the prospective colorist, attaching a link to a Photoshop tutorial on how to shade and highlight an image to make it look 3D, hoping that the tutorial and examples will be enough guidance. There are times when trying to teach someone at a distance is a distinct challenge.

Finally, she checks the discussion forum one last time before settling down to create a new pet. She had an idea for a new line of lynxes that are colored to look like the Carebear series of cartoon creatures. Although she suspects that most of her customers are college-aged, she has noted a certain nostalgic affection for the cartoon characters of their youth and wants to see if she can emulate that look in her product line. As she takes out her digital drawing tablet and stylus, she is smiling. She did not get a real life commission today, at least not yet, but the shop is thriving, and customers are buying out her product as fast as she and her staff can create it. That people like her art is really the biggest indicator of success she could want.

**The value of playing business.** On any typical summer day, hundreds of young people in the U.S. will be engaged in playing business. Many will open lemonade or Kool-Aid stands as indulgent parents and community members smile at them, encouraging their earnest efforts by aiding in setting up the stands or buying overly sweet concoctions because, often at a visceral level, they understand that these children are practicing or developing skills and learning important concepts that will help them later in life. These children are encouraged to emulate adult behaviors with the tacit acceptance that their play is helping reinforce skills they already know, is preparing them for formal learning in the future, or is foreshadowing similar behaviors for that they will enact, for real, as adults.

An educator, looking at a child's lemonade stand would be able to point out how the experience of running this minor enterprise lays a foundation that can be used by future teachers to make abstract and dry financial and economic concepts comprehensible (Philpot & Peterson, 1998). The classic concept that price is set where supply and demand meet, for instance, is reinforced by finding a price per cup that will attract buyers to the stand. Not even the most indulgent neighbor will purchase a glass of lemonade for \$5, but most will go along with the game for a quarter or maybe even 50 cents. In the future, the experience of setting a price for lemonade could be recruited, either by the student or an instructor familiar with experiential instruction methods, to make sense of a fundamental concept in an economics, personal finance, or business course. As was detailed in Chapter One, experiential learning, especially in playful settings, has been identified as an important factor in successful teaching of financial literacy and related

economic or business concepts (Ash, 2009; Bateson, 2009; Bliermell et al., 2010; Chen et al., 2010; Dalgarno & Lee, 2010; Hornick & Thornburg, 2010; Koehler et al., 1995; McClenaghan & Aslam, 2009). Hence, the educator reinforces the common sense approach that encourages play as a way to gain potentially useful experience that can be recruited as part of learning (Kolb, 1984).

The same educator, however, when looking at the virtual pet business might not so readily see how virtual business play similarly enables children to practice and develop skills that will be useful to them later in school and in life. Too many educators, unfamiliar with complex computer games and the functioning of virtual worlds, might miss the connections made recently by Marc Prensky between the lessons of the lemonade stand and those learning in managing resources in multiplayer games and virtual worlds (2012). Just as with the lemonade stand, the experience of managing a business in a virtual world enables young people to practice and develop skills that they will use later in life. They emulate many adult behaviors, often at a level that cannot be safely attained by children playing at business in their real life neighborhoods.

As a proprietor of the virtual pet business, Nyght's concrete experiences illuminated for her some very abstract concepts in a fashion similar to that of the lemonade stand operator. As described in Chapter Four, Nyght experienced the forces of the marketplace in setting prices for the *Gaia Online* items as she observed and participated in transactions in order to amass enough capital to start her own business. Then, she experienced the same conundrum as the lemonade stand owner in deciding how to set prices for her own wares. In her first business, customers pushed back on the

pricing scale, seeking to negotiate lower prices for the pets; the second shop priced pets lower in a deliberate move to attract more customers. When Nyght took a formal economics course, the concept of supply and demand influencing price was not dry or abstract for her. She already understood it implicitly, having experienced it in the same way that a student who sold lemonade one summer would understand it.

The major difference between the summer beverage stand and the virtual business is that an instructor might readily call upon the example of the stand to illustrate financial concepts but be entirely unaware that students who had played with computer games and virtual worlds would also have experiences that they could draw upon for help in understanding challenging concepts from an experiential standpoint. The following section will use the experiences of the case study participant to illustrate how development of a business in a virtual world can facilitate the development of financial literacy among teen and young adult business owners.

### **Financial Literacy Learning in Virtual Worlds**

**The importance of the right world.** While most virtual worlds and massively multiplayer online games (MMOGs) have virtual economies (Castronova, 2001; Dibbell, 2006), they do not simulate all, or even most, aspects of our real life economy. Every designed world is a simplification that incorporates parts of the natural world in order to make an engaging game or hang out location, and as such, each one has limited utility in teaching financial literacy. As shown in Chapter Two, even those designed for the purposes of teaching financial literacy address only a subsection of the full domain of financial literacy topics and levels of understanding associated with financial literacy.



Based on Nyght's experiences as a virtual business owner in *Gaia Online*, Table 6 above shows that many topics in financial literacy were part of her experiences in this world, but there are also many gaps. Some topics, such as earning an income, investing and making purchases are part of the core functions of *Gaia Online*, and even the most casual of residents will engage in these activities at a superficial level. Only residents, such as Nyght, who manage to appropriate the virtual world tools to meet their needs, will encounter other aspects of financial literacy, such as saving and managing a business. The virtual world did not provide mechanisms explicitly for saving money and items or for operating a user-created art business. Residents found creative ways to use functions of the virtual world to enable them to stash away money, create business accounts, and turn user community guilds into businesses. Through social mechanisms, these uses for tools spread, were improved upon, and created a loose coalition of businesses that operated in similar fashion, forming a set of common practices and norms that they jointly enforced. Some aspects of financial literacy were never incorporated into the virtual world, at least not in the way Nyght used it. Neither credit nor insurance were part of her experience, nor is it apparent to the researcher how these two topics might be addressed in *Gaia Online* as it exists at this writing.

An examination of Table 4, however, shows that for most combinations of topics and levels of understanding of financial literacy, there is a computer game or virtual world that could be used as an adjunct to learning. If, as is noted below in the discussion of future research, this framework could be used to classify a wider selection of computer games and virtual worlds, educators might be able to locate the right digital venue for

their students' learning and exploration. Yet, no matter what computer game or virtual world is chosen, care must be taken to remember that all virtual worlds will deviate from how the real world economy functions.

**Fidelity of the virtual world to the real one - how much in what areas?** As a simulation, this virtual world does not incorporate all aspects of the real world economy, meaning that it is useful for some learning situations but not all. For educators, this is a necessary feature, allowing students to experiment with and understand a subset of financial concepts without being overwhelmed by the full complexity of the real world economic system. In teaching economics or finance, many complex systems are simplified into models and equations for inclusion in courses and textbooks.

The virtual economy does not mirror the real one in many respects, and this would be an area for educators to be aware of when working with learners. There are many costs that exist in the real world that do not exist in the virtual one. Products do not degrade over time or in use in *Gaia Online*, although they can be deleted. There is no cost to storing items indefinitely; so a resident can hold onto something that is not valuable, hoping that it will appreciate in value, without having to factor in the costs of holding onto it, as would be necessary with physical merchandise. Nothing can be destroyed by accident although items can be deliberately deleted by owners or taken out of the economy when people delete their accounts. Copying user-created art is possible, but items cannot really be stolen. Production costs are very low, especially since many of the owners of shops create their own artwork. There is no tax or employment overhead. Official items can be replicated indefinitely. *Gaia Online* limits some merchandise to

keep it more valuable by selling it only during a month, hence limiting the number released into the economy.

The practice of buying and selling items with ease can be problematic. In real life, a person cannot usually resell an item (such as clothing) for as much as they paid for it. In *Gaia Online*, however, an item that has been purchased as an investment can be used without reducing its value. Nyght in fact, suggested that investment items should be things that the resident would use because, “if you have to hold on to it for a while, you might as well use it” (Nyght personal communication, December 21, 2008). But, if we were to use *Gaia Online* as a virtual world for educational purposes, this would be a discussion point - how the world is and is not like real life.

There are also few regulations in *Gaia Online*. The playful, virtual world economy has few rules, and those exist only to make sure that people do not abuse the system. Learners would need to be made aware that the real world has many regulations that are not present when running a virtual world business, such as taxes, employment law, zoning, etc.

On the other hand, the trickle of Gaia gold that people earn by doing online tasks is somewhat scarily like teaching office workers to communicate online by rewarding them with micro-payments. They are paid for their activity rather than their time.

The valuation of time by residents, even producers in the user-created art forums, is problematic. In traditional financial literacy and economics theory, time is valuable. Employees are paid for their time and not their products, and companies are generally very sensitive to value of productive time. In the virtual world, time is often not

considered a cost of production. Since these participatory culture hobbyists are doing “work” that is really leisure for them, they do not think of their time as something they should charge for. On the other hand, as Nyght got older and showed less interest in managing the business, her time became more valuable. She seemed willing at the end to produce customs and breedings, which command a high price, rather than the basic, low-priced pets.

**The importance of how learners play.** Finding the right world, however, is only part of the challenge. The use of online games and virtual worlds does not necessarily lead directly to subject matter learning. Some educators have learned that the games themselves can be distracting for some learners (Lim et al., 2006), and students without an interest in the subject may not show improved learning outcomes from playing a financial literacy game (Ozercan, 2010). In Nyght’s case, she was deeply committed to the project of her own success as a business owner, which impelled her into cycles of meeting business challenges by experimentation and learning. She used the world, formal learning, and her background together as the foundation for her experimentation and success with running virtual businesses in *Gaia Online*.

As discussed in Chapter Four, many of Nyght’s learning episodes correlated with business challenges triggered by changes in the *status quo*. Changes in levels of customer interest, either increasing or decreasing, were particularly important triggers for experimentation and learning for her, causing her to seek out information and feedback from more experienced business owners and even customers. Since *Gaia Online* is a sandbox environment and has reward and feedback cycles, students can experiment with

strategies, see the outcomes, and try again. For instance, when Nyght spent months experimenting with the appearance of the eyes in her pets, the user community's silence served as feedback, indicating that she needed to improve her product until she finally hit upon an appearance that attracted customers again. For many classroom situations, such a free-form environment might not be appropriate.

Because Nyght was deeply invested in the success of her shop (Nyght, interview, July 31, 2010), she was not only very persistent but also roamed up and down Bloom's taxonomy of higher-order thinking skills. She *remembered* and *applied* many financial concepts she had learned in her economics class in order to *analyze* purchasing decisions, *evaluate* relative business strategies, and *create* not only the digital artifacts (her pets) but also the business itself by appropriating tools created for other purposes in the virtual world. While the open nature of the virtual world allowed her the latitude, and even encouraged her to exercise her creativity and recruit the skills and concepts she had learned, the way Nyght used the world was a significant factor in how much she was able to learn and practice of financial literacy. As Andrew Churches wrote about learning with digital tools: "It's not about the tools, it's about using the tools to facilitate learning" (2009, p. 1).

**The importance of mentors and formal learning.** Effective experiential learning requires well-informed mentors. As Prensky noted in his essay about virtual worlds as the new lemonade stand, young people will become exposed to many ideas in practice but will often not have been exposed to the conventional terms for the concepts (2012). In Prensky's essay, he pointed out how a young man understood the concept that too

many helmets on the market deflate the price of any given helmet, he did not know the correct terminology and might have encountered difficulty in conveying his understanding. He would, for instance, probably have been unable to answer a multiple-choice test correctly without knowing the specialized financial or economic terms for the phenomenon he had encountered. This situation, as Prensky notes, is the reverse of what usually happens in formal schooling, and which is assumed in the model of financial literacy understanding presented in Figure 3 above. Concepts, presented by explanation and vocabulary development, are assumed to be the precursors to application of concepts or experience of phenomena.

In Nyght's case, she had also encountered situations in which she understood a financial principle tacitly before she was exposed to it as a formal concept. She had understood supply and demand by watching how scarce items sold for large amounts of gold early in her investment career, possibly as early as 2005 (Nyght, personal communication, December 21, 2008). Once she had taken her basic economics course, however, she was able to formalize her understanding and draw graphs modeling her observations. In other cases, her formal education helped her understand experiences that she had encountered, but without a framework in which to understand something like perfect competition, she had not fully appreciated it. Hence, based on her case, the researcher posits that experience or conceptual knowledge may precede the other, but a full understanding and ability to effectively apply a financial principle may require both a conceptual knowledge (*remembering* on Bloom's taxonomy) and experience (Bloom's *application* level). As is discussed below, further research is needed to refine the

framework and test its applicability to a wide range of financial literacy learning interventions.

In this study, the case subject learned and developed proficiency through the combination of virtual world affordances and human mentors. Nyght repeatedly employed the strategy of asking for advice and help from the *Gaia Online* community, especially seeking out people whose art and business success she admired. These online mentors were part of a broad learning ecology (Barron, 2006) that incorporated professional parents, formal college coursework in economics, books, and numerous online tutorials. This learning network along with the opportunities and affordances of the virtual world together provided Nyght with a structure she could leverage in order to develop greater financial literacy. Like a rock climber using two sides of a crack in order to climb, pushing against one and then the other in order to ascend, both the social network and the virtual world were necessary to create an effective learning environment. Without the virtual world in which to experiment, Nyght would not have been able to apply the conceptual understanding she gained from school and her parents. She would have remained at the *remembering* stage of Bloom's taxonomy until the point at which she had to apply her understanding using real money. Without mentors, however, she would have a tacit and incomplete understanding of phenomena she had encountered and have been unable to express her understanding among financially literate people.

**Pro-Am environment.** As part of the social network in which Nyght practiced her financial literacy, some characteristics of the breedable pets community itself are important. As explained in the description of the case in Chapter Four, Nyght's shop

exists in a subsection of *Gaia Online* in which hundreds of shops operate, creating art and selling it to other residents of this virtual world. While many shops, particularly the larger ones, sell some of their art for government-issued currency, most operate as hobbyists. As hobbyists, they sell their creations for the alternate currency Gaia gold and participate in this environment predominately as a form of creative expression and enjoyment, similar to the majority of the merchants who operate in the famous virtual world *Second Life* (Boellstorff, 2008).

Despite their technically amateur status, some of these hobbyists are showing signs of operating as “pro-ams”, that is amateurs who adopt professional or near professional practices at a level that would mark them as professionals if they were paid for their work. In the breedable pets shops that operate in Gaia Online, shop owners may adopt authentic practices that, if they were participating at this level in the “real” economy, would be considered professional business people. The larger businesses in this user community routinely employ or contract with a number of people in order to perform various functions in the shops. Nyght, for instance, at times employed as many as seven staff members: a thread manager, an event manager, a role-playing manager, a certist, a general manager, and two or more colorists. As the shop’s owner, she made sure that the staff members had work to do and that they met the shop’s quality standards. In some cases, she had to work with new colorists to improve their work, teaching them to use digital art tools correctly. Giving constructive feedback was one of the skills that she found the most difficult to learn, but it was also one of the skills she seemed most proud to have begun to master.



Not only did Nyght employ this range of people, she also had instituted a number of practices that begin to look remarkably like an office of collaborative, creative knowledge workers. The staff in her shop had a private forum that they used for staff meetings. Some shops use real time chat to hold their meetings, but since some of the staff members were from other countries, Nyght preferred to use the asynchronous forum discussions to allow time for translation and understanding. Additionally, although Nyght did not point this out, the forum discussions are permanent; so staff members could review what was decided in order to check their understanding and remind themselves of group decisions. Private messaging, which is also asynchronous, was also a useful means of communication when rapid turn around was needed for a question.

When a hobbyist business owner is managing a staff of seven people, even part time, this playing at business begins to look like a legitimate practice of business. The breedable pets section of Gaia Online is not necessarily unique in moving in this direction. Prensky reported seeing similar collaborative, teamwork practiced among players of the online game *Runescape* (2012), and Steinkuehler and Johnson found that people who modify online games such as *World of Warcraft* may also create communities in which they practice and teach newcomers to create computer programs using industry standard protocols (2009). Nyght and other young people are learning not only financial literacy by virtue of participating in this pro-am community, but they are also learning how to run a business using entirely online communication and tools, a skill which might well prepare them to engage in the future of business in a global, digitally-connected world (Edery & Mollick, 2009). Part of what these residents of virtual worlds,

especially business owners, are learning is how to manage communication online in the emerging virtual business environment.

**Paradigms of online communication and interaction.** Nyght commented in February 2009 that she had one customer who posted “all the time and who I chat with and keep the thread active with” (Nyght, interview, February 7, 2009). During some periods, Nyght and a particular customer would converse through the discussion forum, sometimes exchanging five or six posts in an hour, especially if they were engaged in collaborative role-play story-telling episodes. This form of interaction, using asynchronous discussion forums for (nearly) synchronous communication is an interesting appropriation of the tools for an unintended purpose, which is nearly a hallmark of the digital natives’ use of social networking tools. The rapid communication could have taken place just as easily in synchronous chat, and residents did occasionally invite others to join them in a chat room. During the early case study period, *Gaia Online* did not have its own integrated real-time chat function, but even when the feature was added, customers and the shop owner tended to use the discussion forum for conversational exchanges. This practice may have been influenced by a number of factors:

- 1) The main discussion forum is the entrance for new people to find the shop and is the one that is visible to the general public, floating in the listing of the breedable pets forums. This position of these shops near the top of the page is maintained by forum activity, and a shop that is near the top is seen as more popular and interesting, which is more likely to attract notice. So, maintaining an active discussion forum through

frequent, nearly synchronous posting served to position the shop favorably. Like any other business, location is extremely important, and Nyght and her regular customers knew that.

2) The discussion forum posts are permanent, unlike text chat conversations. This allows other customers to see the conversation when they can join in throughout the day. This allows them to review what is being discussed and join in, letting them be part of the conversation and to feel present and connected to the shop as they are able. Like reviewing friends' *Facebook* status during the day, this is a form of being connected and co-present digitally.

3) The discussion forum posts are public and highly visible, unlike text chat conversations that take place between two people; other people may be unaware that they are occurring. The public nature of the conversation allows discussants the opportunity to show off their avatar and signature lines, through which they express their own creativity, announce events and advertise for other shops, and request aid toward achieving their own goals. Hence, these shops tended to use the discussion forums as a place to converse so that they could build connections and bridges between them through members who participated in multiple guilds and shops. They often advertised for their own shops through discussion forums of other shops, a practice that was encouraged rather than seen as unfair competition.

**Experimentation in the financial sandbox.** Although there are ways in which computer games and virtual worlds emulate their real world counterparts, their nature as a low-risk sandbox remains essential. This environment provides a space in which learners

can experiment with adult behaviors, such as investing, managing their money, and creating a business before they must make consequential decisions. In such an environment, they can try a strategy, receive feedback, correct their understanding, and try again without risking their entire retirement savings account or putting their house into foreclosure. Instead, they can get the sense that certain risks really are too great to manage before failure to apply a concept correctly leads to a monumental, life-changing problem.

In this regard, the economy of *Gaia Online* is a useful financial literacy sandbox. Mistakes in the world are relatively inexpensive. If a user makes a poor purchase of a *Gaia Online* item, he or she will at most have lost \$2.50 of real money. It does not cost anything to hold onto a poor choice since there is no storage cost, and if an item on the Marketplace auction does not sell, there is no fee. If a user does not want to use real money to buy limited edition collectables, other more-time intensive alternatives exist through which to earn enough Gaia gold to get into the investment and trading market, if desired.

In this case study, Nyght had great latitude in the choices she could make. She was able to try them out, get feedback on her choices and creations, and see what the results are over time. She tried different strategies, although she often returned to those that had worked well in the past - especially asking peers and customers for ideas and feedback. In reading the discussion forum posts from the case study period, the researcher identified 28 episodes in which Nyght explicitly requested customers to “give

feedback and loving praise xDD” (Nyght, post, July 28, 2008) on either pricing, event and game ideas, or on the appearance of the pets themselves.

**What is the real world?** It is instructive to note that the case study subject differentiated the real world from the virtual world. Although some researchers of virtual worlds have proposed that we should not privilege the tangible world as the real one, the discourse of the business owner and her customers clearly shows that they differentiate between virtual world and reality and between their hobby and their real life social obligations. They also prioritize real life social obligations, such as work and school, over their virtual world hobbies.

This has important implications for educators. This study shows that, despite assertions from other researchers, there is significant intra-group variability in the “digital native” age group in the way they use and make meaning of digital media and virtual worlds. There are many different use paradigms, especially for video games (King, Johnson, & Hayes, 2012) and ways of interpreting the meaning of computer games and virtual worlds in the lives of young people. In this case study, although the business owner devoted significant time and effort into creating a business, it still remained in her interpretation, a leisure activity that should not interfere with the main parts of her social life.

In this case study, the differentiation between real and virtual worlds may exist because Nyght did not know any of the people she interacted with in *Gaia Online* outside of the virtual world. This is different from most teen use of social media, where teens

tend to interact with their real world friendship groups through additional media (Jayson, 2009; Subrahmanyam, Reich, Waechter, & Esponzoza, 2008).

**Separation of hobby and real life exists even among these dedicated game players.** There is so much negative press and fear about online games and virtual worlds taking over people's lives. But Nyght and people in her shop forums frequently take breaks from Gaia when they become busy in the real world. As Nyght said in one interview, "real life comes first" (Nyght, interview, March 2, 2010). While she lamented that the shop is best when everyone is active, she also recognized that people have limited time for their hobby, including her.

Nyght's valuation of her time shifted throughout the case study. Initially, she did not regard time as a cost in either production of pets or in running the business. She casually mentioned in an early interview (February 9, 2009) that creating the pets didn't cost anything, clearly overlooking the many hours she had spent in creating the shop and the many pets she sold. Eventually, she began to comment on time as a limiting factor that determined how much role-play she would expect of customers, what events she would put into the shop's overarching narrative, and how many customized pets she would create. The shop began to create the more complex pets in the last two years, for which they charged a much higher price because the complexity required more time and effort. By the time the shop closed in 2010, lack of time to devote to the running of the business was cited as the main reason that she and the shop's regular customers had decided to close the digital doors.

However, the two worlds were not entirely separated. Nyght admitted that she would think about the shop and “brainstorm new plot ideas and event ideas during boring lectures” (Nyght, interview, February 7, 2009) and even while sitting in on face-to-face gaming sessions (Nyght, post, January 30, 2009). As discussed in the next section, Nyght continued to blur the boundaries between her real and virtual worlds as she began to evolve her virtual business, moving to selling her digital artwork for legal currency and exploring the creation of an incorporated real world business.

**Potential for transfer of simulated behavior to real world behavior.** Some studies have suggested that simulated financial behaviors in games may have an impact on financial behaviors adopted in the tangible world with legal currency (e.g., Donnini et al., 2011). In this case study, the participant progressed over time from being a consumer in the virtual economy through owning and managing a virtual world business to eventually bridge out to managing a digital media business in the real world. By the end of the case study, she also had begun the complex process of creating a legally-recognized real-world business that would produce, print, and ship artwork created not only by the case study participant herself but also other contracted artists. While the researcher is careful to avoid making claims that the virtual world experience resulted in a transfer of skills and confidence from the virtual to the real world, it seems likely that success in one venue was a contributing factor in developing the skills, confidence, and an identity that supported the move to create a real world business.

Additionally, Nyght moved from managing virtual accounts and transactions in the play space of *Gaia Online* to managing her real life accounts using online tools.

Again, the correlation of these two behaviors does not indicate causality, yet it is suggestive. The experiences in the virtual world show the potential to support learning and development of behaviors that could transfer, nearly seamlessly, to modern banking and money management practices in a digital world in which customers connect to their banks via Websites and mobile applications.

### **Revised Types of Financial Literacy Understanding**

In order to evaluate and compare financial literacy computer games and other digital media, a taxonomy of levels of understanding was developed in Chapter Two. This taxonomy was an extension of the model created by Hung et al. (2009) for use in evaluating a broad range of financial literacy educational interventions. Their composite definition of financial literacy included financial knowledge (concepts), financial skills (application), perceived knowledge, and financial behavior (behavior).

In order to apply their framework to studies of financial literacy computer games, the list of levels was expanded in Chapter Two to include experiences and mediating relationships with financial institutions. Perceived knowledge as a level of understanding was extended to include not only one's self-perception as a financially literate person but to also include cultural and socio-economic status influences that would impact the types of relationships formed with financial institutions (positively and negatively) and the types of financial behaviors adopted.

These levels were related to one another to foster desired financial behaviors in the model shown in Figure 3. At the time of this model's creation, based on studies of formal financial literacy education, conceptual knowledge was thought to precede



applications of financial concepts in order to have experiences in financial situations. This conceptual knowledge included an ability to understand and use the specialized language of personal finance. In order for experiences to translate into long-term financial behaviors, it was also theorized that identity and relationships with financial institutions would be mediating factors, either fostering desired behaviors (such as saving for retirement) or encouraging problematic ones (such as relying upon too much credit card debt).

Based on the results of this case study and naturalistic observations of Marc Prensky (2012), the model developed in Chapter Two needs to be revised in order to describe how financial literacy understanding develops and is evidenced in informal situations. As described in Chapter Four, Nyght had developed an understanding of some concepts based on her experiences in the virtual world. Hence, financial experiences may precede and ignite conceptual understanding as learners participate in the economy. Similarly, a learner does not need to apply concepts learned in formal settings in order to have financial experiences. Hence, the implication that conceptual knowledge and the ability to apply it to situations are necessary to have experience in the economy needs to be removed from the relational model.

The role of specialized language in financial literacy learning is problematic in this reconceptualization of types of understanding. In formal educational settings, learning and using the specialized language appropriate to the discipline is often a key component in the process, and the ability to understand and answer questions using the language are often instrumental in evaluating student learning outcomes (Gee, 2004).

Hence, in the formal educational setting, specialized language and conceptual understanding are closely related. By contrast, informal learning and natural settings, learners and participants can show evidence of understanding by their behavior or describing phenomena without being able to use the specialized language of the domain in which they are acting, which would indicate a loose connection between conceptual understanding and the ability to use terminology from finance and economics. Because of the difference in relationship based on setting, a non-directional connection is made between these two aspects of understanding in the revised model in Figure 15.

Finally, as DeVane showed in his study of financial discussions in a hip-hop related discussion forum, specialized language usage is connected to a person's identity and membership in particular communities (2009). Nyght's use of specialized financial terms indicated, intentionally or unintentionally, that she was a certain kind of person – one who used these terms as part of her schooling and or daily life. She also used the terms that had become common in *Gaia Online*, such as referring to ready assets as “pure”, as part of indicating that she was also a member of the community in which she operated her business. While an in depth analysis of the discourse used by business owners and customers in the breedable pets forums is beyond the scope of this case study (see Chapter Five), it is important to note that fluency with specialized financial terms is an important aspect of financial literacy. The ability, or lack thereof, to use the terminology employed by financial institutions may have a significant impact on the ability of a person to interact with these institutions. Hence, in the revised model of financial literacy understandings, specialized language is separated from conceptual

understanding but is related to both concepts and identity, through which is mediated the establishment of relationships with financial institutions.

While it was not the purpose of this case study to develop a theory or model of the components of financial literacy, this conceptualization of the relationship between types of understanding associated with personal financial literacy is suggested as a way to classify and compare financial literacy educational interventions. It is also presented to foster discussion about how to assess financial literacy learning, especially in experiential or informal learning situations. As mentioned below, future research and evaluation is needed to refine and evaluate this model's usefulness in understanding financial literacy educational interventions and programs.

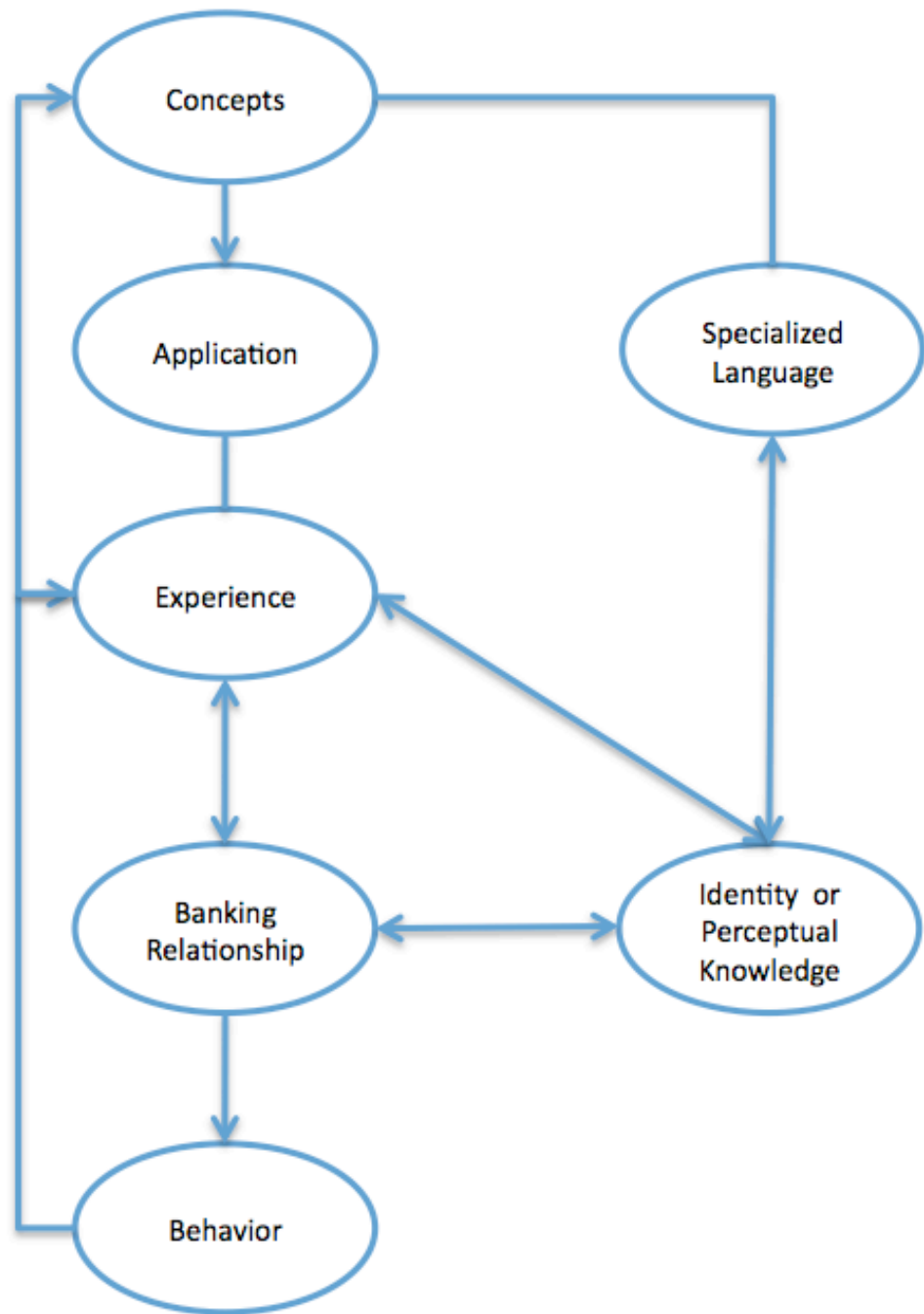


Figure 15: Revised Model of Financial Literacy Understandings

## **Limitations**

**Uniqueness of the participant.** By focusing on one participant in a single-case study, results are not generalizable to a larger population. Nyght's experiences are unique and took place in a small section of this vast virtual world in which there are millions of inhabitants. This study is akin to attempting to understand how the economic system of Manhattan supports the financial literacy development of young shop owners by studying the experiences of a single business owner in a friendly, supportive neighborhood of similar businesses. While this case study provides a beginning framework for understanding how features of the virtual world could support learning of finance and economic concepts, the participant's particular learning ecology (Barron, 2006) heavily influenced what features she recognized and was able to appropriate in order to learn and succeed in her business. As is noted below in the discussion of future research opportunities, further studies are required to evaluate how younger, more typical residents of *Gaia Online* employ features of the virtual economy, especially those who do not own virtual businesses.

**The changing virtual world landscape.** The virtual world is one of rapid change, and at times, these changes made it difficult to interpret and understand the experience of the case study participant accurately because aspects of the virtual world had evolved between the point in time when the participant closed her shop and the researcher captured the forum posts. For instance, advertising for outside companies had been virtually non-existent in the forums during Nyght's tenure as a shop owner, but at this writing, nearly every page in *Gaia Online* includes some advertisement. Hence, there

had been confusion during the analysis of interview and post data about how to interpret the participant's apparent blindness to ubiquitous advertising. This confusion evaporated after a period of participant checking and discussion between the participant and researcher. After the discussion, the researcher confirmed Nyght's recollection by reviewing discussion forum data saved in 2009 and 2010. These files do not include the advertisements found on the same discussion forum pages when they were downloaded in 2012. The episode serves as a warning about changing nature of this and any other virtual world. Features and tools may be added, changed, or deleted between this writing and another researcher's foray into *Gaia Online*.

Additionally, there were points in the discussion forums in which posts were edited or deleted, which was confusing at times and also removed episodes and potential data from the corpus. Most of the business-related public discussions seem to be intact, although there are occasional pages that have become inaccessible in these forums for unknown reasons. While they do not seem to affect the interpretation of the conversation in search of finance-related themes, their absence must be noted and also serve as a caution for future researchers. In discussion forums, writers can usually edit or delete what others may consider permanent.

The business owner frequently edited the first pages of the forum, in order to update the rules and shop information. In effect, this was the only mechanism that a business owner can use in this space to provide updates to customers and visitors; so editing and updating these pages are necessary to keep the business functioning effectively. In the case of this business, the owner usually made note of the changes and

the dates upon which the changes became effective, which provided the researcher with a convenient location to check for major episodes that should be coded for themes.

**Restriction to public data.** Only publicly viewable posts were used in this case study. Private, staff-only forums were not examined. The downside of this is that business-related discussions were not coded, and these may have revealed greater coverage of understandings of how the financial system of the online world operates. These posts were not examined because of the difficulty of contacting and getting permission from all staff members involved in the shop over the course of five years. Some people are no longer involved in *Gaia Online* and could not be reached. Also, the case study was designed to focus on the experiences of one participant and the aspects of the virtual world that Nyght used in establishing and running her businesses. If permission could be obtained, this might be an area in which future research could reveal greater understanding of how financial literacy education conducted between peers involved in a joint enterprise.

**The digital divides.** Focusing on researching financial literacy through online computer games and virtual worlds is also likely to neglect the experiences and situations of people unable to access the computers and networking systems upon which they run. While this case study intentionally situated itself in a low-technology world, similar to the games being developed for low-income women by Doorways to Dreams (Maynard et al., 2011), the researcher recognizes that those people who are the most financially vulnerable may not be able to participate in financial literacy interventions in this or any other computer-mediated communication medium. Throughout the case study, Nyght

had customers who reported that they were periodically unable to get into Gaia Online to participate because of slow Internet connections or old computers. Although the breedable pets shops designed sales types to accommodate people with technical difficulties (see the end of Chapter Four for this discussion), some people were excluded because of their location on the wrong side of the digital divide.

### **Future Research**

**Experiences of typical participants in the virtual economy.** One area for future research is to investigate the experiences and learning of more typical residents. Golde's demographics suggest that business owner was not typical of Gaians (2008). The average Gaian is cash-poor and needs to liquidate existing inventory in order to buy new items. However, as this case study has revealed, some *Gaia Online* residents are fluent with using a barter system for exchange and purchasing of items, even using Gaia items as payment for user-created items. There are hundreds of people running shops in this world - some doing very clever things in regards to financial literacy and entrepreneurship. Hence, relying upon the possession of liquid assets ("pure" Gaia gold) as a way to assess the average wealth of residents may be a poor indicator of their actual net worth. In contrast, business owners are often able to invest significant amounts of Gaia gold in purchasing "space" for the businesses in the form of reserved clusters of discussion forums called "guilds", which cost up to 20,000 Gaia gold.

The customers of the case study participant also seemed to be more financially prosperous and older than the average Gaian, often able to purchase relatively expensive



pets. However, some of them indicated in the forum conversations that they had to work hard and save up for a period of time in order to buy the pets that they desired.

Nyght comes from a background that makes her likely to develop moderate financial literacy without any special help; she is interacting with people who show similar financial sophistication. And her background only makes her more likely to take advantage of the affordances of her environment. The richness of the virtual economy is there for her to use and discover - her background does not create it. And there are people with whom she interacts who show similar levels of sophistication. Tektek.org recreated a stock market valuation information site for these digital collectables. There are hundreds of other businesses in *Gaia Online*; some of them were Nyght's inspiration and mentors. And other experienced users have been the go-to sources for things like valuation of trade offerings.

Even residents of *Gaia Online* often do not know that this section exists, and Nyght at one point expressed that the “breedables forum is just so different than many other parts of gaia [sic]” (Nyght, post, June 30, 2010). Future research should be done to determine how typical Gaia business people and their customers are, and if necessary, research the financial experiences of more typical Gaia residents.

**Full coverage of financial literacy subject domains and understandings.** Since this was a single-subject case study, the experiences and practices of the participant are idiosyncratic and may not have illuminated the full range of possibilities present in the functioning of the economy of *Gaia Online*. This is especially problematic given that many of the business features used in the shops of the breedable pets forum exist through

social interaction, collaborative development of community practices, and creative appropriation of the designed features of the virtual world. While exploration of the business affordances through this case study revealed that many topics and types of understanding of financial literacy may be practiced in engaging with these shops, several were not evidenced in either the interviews with the business owner or in reading the public discussion posts. Topics such as insurance, managing credit, budgeting, and money management may be more significant parts of financial literacy in *Gaia Online* than is evident from this one case.

Additionally, other sections of the virtual world may have developed their own systems for managing finances in the absence of designed financial institutions and systems. As the participant and her customers made use of alternate accounts to work around the lack of banks and savings accounts, other communities within *Gaia Online* may have developed their own methods of managing credit or delayed payments within their groups.

**Discourse Analysis.** While Nyght made use of the specialized language of finance both in interviews and in the shop's discussion forums, many of her customers did not. Instead, they used a hybrid discourse, employing a mix of locally employed terms (such as "pure" to describe assets held in Gaia gold vs. in Gaia cash or items), recognizable terms from the financial system, and inexpert descriptions of financial concepts or activities couched in common discourse. Future research, similar to that conducted by DeVane (2009) with the hip-hop forum or Maynard et al. (2011) with the low-income women should be conducted to learn the financial discourse of these tweens, teens, and

college students. This may help many of them to translate their tacit understanding of essential concepts to testable and recognizable financial literacy in school and daily life.

**Classification of games using the financial literacy framework.** In preparation for this case study, the researcher classified 21 financial literacy computer games or virtual world educational installations. As evidenced in Tables 3, 4, and 6, these games are designed to address particular subject domains within financial literacy, but no one is capable of addressing all. Therefore, educators must know what topics are incorporated into a game or virtual world before they are able to evaluate the usefulness of a computer game or virtual world to fit with their state's standards and lesson plans.

Currently, organizations such as the Jump\$tart Coalition for Personal Financial Literacy maintain lists of games, simulations, and social media that they have evaluated for use in financial literacy education settings, but these sites do not have an organized framework for indicating the addressed subject domains or the levels of understanding recruited by the games. For a busy educator, this lack of an organized collection can be a major barrier to implementing educational games. The Jump\$tart Coalition's clearing house alone lists 102 computer games and simulations, and while it is organized by age appropriateness, subject domain is only discoverable upon reading the description of the listed item. Further research is required to evaluate the accuracy and effectiveness of the framework developed in Chapter Two and revised in Chapters Four and Five (see Table 10 and Figure 15) to guide educators in choosing educational computer games and virtual worlds for their classes.

**Financial literacy education using a virtual world.** Can *Gaia Online* be used to support formal financial literacy education? This case study has explored how a particular user evidenced and practiced financial literacy in a naturalistic environment over five years. The breedable pets section in particular shows promise as a supportive environment in which financial literacy is practiced and discussed. The social practices in this area, especially of the more expert business owners, guide publishers, and community organizers, seem to provide a context in which learners can participate in authentic, situated discussions of financial concepts and experiment with strategies of earning, saving, investing, and purchasing. A logical next step is to create an age-appropriate financial literacy curriculum designed to leverage experiential learning in a virtual world economy and test it in *Gaia Online*, using a pre/post test protocol. If results of that study were promising, then a quasi-experimental study would be warranted to evaluate the effect of the intervention against a control group, also using a pre/post test protocol.

### **Conclusion**

As discussed in Chapter One, financial illiteracy is a serious problem in the United States, potentially contributing to the current economic crisis through wide spread poor decision making on the part of average citizens who carry too much debt and save too little to sustain their lifestyle and the health of the larger economy. Unaware of the risks they are taking, and often unable to read and understand the information provided to them by financial institutions, too many average consumers make decisions that

individually are harmful to their long-term financial health and as an aggregated whole can cause major repercussions in the local and global economy.

This state of widespread financial illiteracy has its roots in a lack of widespread, effective educational opportunities. Few states require education in personal finance at the high school level, and when education is offered, it has been shown to be largely ineffective. This situation, however, might be improved by changing the way financial literacy education is offered. Experiential methods, especially incorporating game-like activities have shown promise in improving scores on the national assessment administered by the Jump\$tart Coalition.

In light of the improvements shown in using experiential methods for financial education, this study has explored how the experience of running an amateur business in a virtual world facilitated the development of financial literacy in one young participant. This case study described the virtual world and how financial literacy manifests with it, how the financial literacy of this world compared to a general model of financial literacy, and how the case study participant's virtual experience and identity intersected with her real world identity, confidence, and behavior as a financially literate person. This case study also showed how the affordances of the virtual world of Gaia Online combined with the social world of the participant *together* facilitated her continuing development of financial literacy. While more research is indicated, the combination of instruction, support, and a safe setting in which to practice and gain experience seem to be necessary for development of the complex collection of subject comprehension and levels of understanding that comprise financial literacy.

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